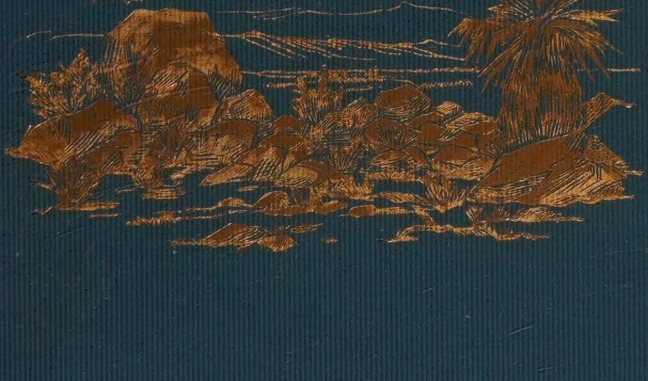
THE WONDERS OF THE COLORADO DESERT



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of

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(Southern California)

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Including an Account of a Recent Journey made down the Overflow of the Colorado River to the Mysterious Salton Sea

By GEORGE WHARTON JAMES

Author of "In and Around the Grand Canyon," "The Old Missions of California," etc.

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IN THE DESERT

Silent Voices have spoken,
Peace has come,
Joy has flowed,
Courage has grown,
Health been regained.

To the SOURCE, the Maker of Deserts, with a thankful heart, I dedicate this book.

349382

TO THE COLORADO DESERT

Thou brown, bare-breasted, voiceless mystery,
Hot Sphinx of nature, cactus-crowned, what hast thou done?
Unclothed and mute as when the groans of chaos turned
Thy naked, burning bosom to the sun.
The mountain silences have speech, the rivers sing;
Thou answerest never unto anything.
Pink-throated lizards pant in thy slim shade;
The horned toad runs rustling in the heat;
The shadowy, gray coyote, born afraid,
Steals to some brackish spring and laps, and prowls
Away, and howls, and howls, and howls, and howls,
Until the solitude is shaken with an added loneliness.
Thy sharp mescal shoots up a giant stalk,
Its century of yearning, to the sunburnt skies,
And drips rare honey from the lips
Of yellow waxen flowers, and dies.
Some lengthwise sun-dried shapes with feet and hands,
And thirsty mouths pressed on the sweltering sands,
Mark here and there a gruesome, graveless spot,
Where some one drank thy scorching hotness, and is not.
God must have made thee in his anger, and forgot.

— *Madge Morris Wagner.*

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INTRODUCTORY

HAT is a desert? Does any one know? The dictionary says it is "a deserted place or region; a waste; a wilderness; or, specifically, in geology, a region of considerable extent which is almost if not quite destitute of vegetation, and hence uninhabited, chiefly on account of an insufficient supply of rain." This, doubtless, is an accurate definition, yet all of the region described in these pages, though commonly included in the boundaries of the Colorado Desert, by no means comes under so rigid a description.

Indeed, in actual fact, there are no such regions known upon our earth; for the Great Sahara, the desert of all known deserts, which covers an area of 3,500,000 square miles, "though distinguished by aridity of climate, scarcity of running water, dryness of atmosphere, and a comparative paucity of vegetable and animal life, has rainfall, streamways, vegetation, and diversity of configuration." Furthermore, far from being uninhabited, it has a population of 2,500,000 people, or an average of seven-tenths of one person to the square mile.

Few people, even those who live within a few miles of the desert, have any right understanding of what it is. The popular conception is that a desert is all sand, — barren, desolate, unfruitful, shifting sands, where the heat is frightful and where nothing can live save horned toads, lizards, snakes, chuckwallas, and gila monsters. This is far from the truth. Read the following descriptions of the mountains. This is all desert region, except on the higher parts of the snow and tree clad San Jacinto and San Bernardino ranges. Read the account of the flowers seen between Mecca and the Brooklyn Mine in April, 1906.

Yet this is all desert. In a month after April the flowers were practically gone, and some years few flowers are to be seen.

In the year 1905 twenty-two inches of rain fell on one part of the Colorado Desert. Such is the desolation, the treelessness, the "soil-lessness" of the region that in a few hours after a rain, that would be productive of great good for weeks in a well-wooded and good-soiled country, scarcely a trace remains. The water sinks out of sight to be lost in the shattered rock strata, or even where there is sand there is no solid rock or clay sub-stratum to make water-pockets, so that the water rapidly seeps away. In places the slope of the country and the lack of soil

Entrance to Murray Canyon

and verdure allow the water to flow rapidly and uninterruptedly to the nearest "wash," from whence it dashes in increased volume, power, and speed to the nearest river or "sink," there to evaporate in the fierce heat of the sun.

To most people the Colorado Desert is not only a place devoid of interest, but absolutely to be shunned, feared, dreaded. If they must journey across it, they do so as hastily as possible in the fastest train, surrounded by all the luxuries modern travel can give; the blinds of the car drawn down if the journey is made by day, and with a sigh of relief and thankfulness if it is made by night.

In other words, civilization has taught us to dread a place that we should often seek. The Arabs speak of the desert as "The Garden of Allah," and he who has lived unworthily must

not desecrate it by treading in its holy precincts, unless he goes with penitence and prayer. In the desert the soul of man finds itself as nowhere else on earth. Here are solitude and God, both necessary, and the *only* necessaries to the full awakening of the human soul. The Arab has learned this. He has a keener spiritual sense than his material occidental brother. The footsteps of Allah are often heard in His desert garden, and the Arab goes to seek and follow them. He sits in the silence and listens for the voices that speak to his soul in the absolute stillness of the desert at the midnight hour. And what these voices declare he verily believes and obeys.

But in the material sense the Colorado Desert is a place of fascination and surprises. On every hand are strange, wonderful, and beautiful things,—things that are unknown to cities and to the unobservant anywhere. No hall of necromancers can equal the desert in its marvels and revelations. Wonder follows wonder in quick succession. And though constant association changes the surprise and amazement of first impressions to a steady and ever-growing affection, the wonder and marvel of it never grow dim.

Yet it is true that the desert is not for everybody. He who loves comfort and ease more than knowledge and power; who is afraid of hardship, solitude, heat, and general discomfort; who values the neatness of his appearance and cleanliness of his apparel more than filling himself with experiences strange and novel, and coming in contact with some of the most wonderful things of nature, had better remain away. The desert will flout him. Its winds will toss his well-combed locks astray and disarrange his dainty apparel; its storms will beat upon him and make him fear the deluge, as well as wash the starch out of his collar; its alkali and bitter waters will nauseate and disgust him, and its sands make his bed a place of unrest and mourning. Its lack of all native foods (except in a few favored localities) will offend his epicureanism, for to live on "condemned" foods is not agreeable to a pampered palate. Here are no smoking, lounging, or writing rooms. Out-of-doors has to answer for

every purpose, and many scores of pages have I had to write on my knee, or on a box, or even my suit case converted into an extemporized writing desk.

No! No! Pampered and feasted sons and daughters of cities, don't come to the desert. It is not for you. You have deliberately chosen your mode of life. It shuts you out from much of what is great and grand and educative and real; but having thus shut yourselves out, don't try to break down the barrier. If you do you will have a "hard time" and return home wearied, disgusted, and disgruntled. Far better read the desert through the eyes of those who, while appreciating what your life has to give to the hungry soul, prefer the larger, fuller, realer life of contact with uncontaminated nature.

The name, Colorado Desert, was first applied to this region by Professor W. P. Blake, when, as geologist of the expedition for determining the best railroad route from the Mississippi River to the Pacific Ocean, he made a comprehensive study of the desert. There is no denying that the use of the word "Colorado" has been a great source of misleading to those who jump to conclusions. Just as the "Grand Canyon of the Colorado" has been supposed (and still is) by thousands to be *located* in Colorado, so is the Colorado Desert supposed to occupy a portion of that great state of mineral wealth. For that reason, therefore, the use of the name is to be deplored, though Professor Blake is deserving of the thanks of the world of intelligent readers and students for giving this section of the great Sonoranian Desert a name which positively identifies it.

Dr. Walter T. Swingle, in his monograph on the Date Palm, advocates a change in the name. Here is his argument in full:

"In the United States the term 'desert' is applied to unirrigated or uncultivated arid regions, and as fast as such areas are reclaimed and put to profitable culture by means of irrigation, they cease to be called deserts and receive some other name. The appellation 'desert' is a hindrance to real-estate transactions, and is

felt to be unjust and opprobrious by those who live in the midst of flourishing fruit orchards and alfalfa fields. Doubtless the same change of name will take place in the case of the Colorado Desert, and indeed the misleading term 'Colorado Delta' has already been applied to the newly irrigated lands about Imperial and Calexico. The true delta of the Colorado River lies to the southward, where this stream enters the Gulf of California. The region in question might very appropriately be called the Salton Basin, inasmuch as it is a true basin, an area surrounded on all sides by mountains or higher lands and depressed far below sea-level in the center, where its most prominent topographical feature, Salton Lake or Salton Sink, is located. Throughout this bulletin Salton Basin is used instead of Colorado Desert to designate the lower parts of the lands sloping toward Salton Lake, a region limited on the north by the San Bernardino Mountains, on the west by the San Jacinto Mountains, and extending southward into Mexico to the line beyond which the delta lands slope toward the Gulf of California."

Indian woman carrying palm leaves

The difficulty with Dr. Swingle's suggestion is that it applies to a portion, only, of the region under consideration, and not to the whole. The San Bernardino Mountains and the detached ranges north, which lead to the Mohave Desert, are a part of the Colorado Desert, and they could not be included in the Salton Basin.

A very common and erroneous impression is that one can stand in the Colorado Desert, at say Palm Springs station, and see the range of mountains that separates the Colorado Desert from that of the Mohave. Such is not the case. There is not only no mountain range dividing them, but there is nothing else that

divides them. There is no authority yet who has divided them, or said where one begins and the other ends. There is no natural boundary whatever, and, therefore, should one be established, it would be as purely arbitrary as are the lines of meridian. For the purpose of this book I have established such an arbitrary boundary. Taking the San Gorgonio Pass as the northwest entrance to the Colorado Desert, and Mounts San Gorgonio and San Jacinto as its northwestern sentinels, I have placed the boundary line between San Bernardino and Riverside Counties as the northern limit, the Colorado River as the eastern limit, the boundary line between the United States and Mexico as the southern limit, and the San Jacinto range, with its southern extensions, going down into Mexico, as the western limit.

A "well-dressed" palm in Andreas Canyon

From these lines it will be seen that the Colorado Desert is confined within the two counties of San Diego and Riverside. That it extends beyond the Colorado River into Arizona, and also below the boundary line into Mexico, all are well aware, but I shall practically ignore these extensions in the following pages.

There being so much of vague mystery about the desert, and so few really knowing anything about it, one need not wonder

that many untrue and silly things have been circulated about it. For instance, not long ago a Los Angeles newspaper published a brief account of the "Palm Grove" in Palm Canyon, and with fine flourishes told that the palms, being dependent upon the heat from the live volcano "that stands near," will soon die. Here is the sage statement: "There is coming a time, however, when the grove will be no more. The heated conditions of the volcano which are necessary for the growth of the palm are gradually subsiding, though internal disturbances show that it has some fire, and recent earthquakes of but a few years past proclaim the powers of eruption not yet quenched, yet these are gradually becoming extinct. They are in fact scarce worthy of consideration; the time will not be long distant when this mountain will be perfectly quiet. The reduction of its temperature, which is necessary for perfect and gigantic Washingtonia, is the means of causing the death of this noble grove. The trees nourished by the volcano of San Jacinto are now dying with the mountain."

This whole quotation is folly, pure and simple, from beginning to end. San Jacinto shows no more volcanic heat than Wall Street in New York, and the idea that such heat, which burns and destroys, should be necessary for the preservation of the life of the palms is neither based upon observation nor reason.

As recently as 1882 a namesake of my own wrote an article in the *Popular Science Monthly*, which, while giving a fair general account of the desert, stated several "facts that are not so," as, for instance: "Men can only be induced to work on the railroad by offering them increased wages," — "Rain never falls on this desert in the natural manner," — and after describing certain gullies, — "These are caused by the rush of water from cloudbursts and waterspouts." Speaking of the sand-dunes and the effect of the shifting sands upon the railway tracks, "It has been found necessary to have a relay of men constantly on the ground, and every day they are engaged in clearing the track."

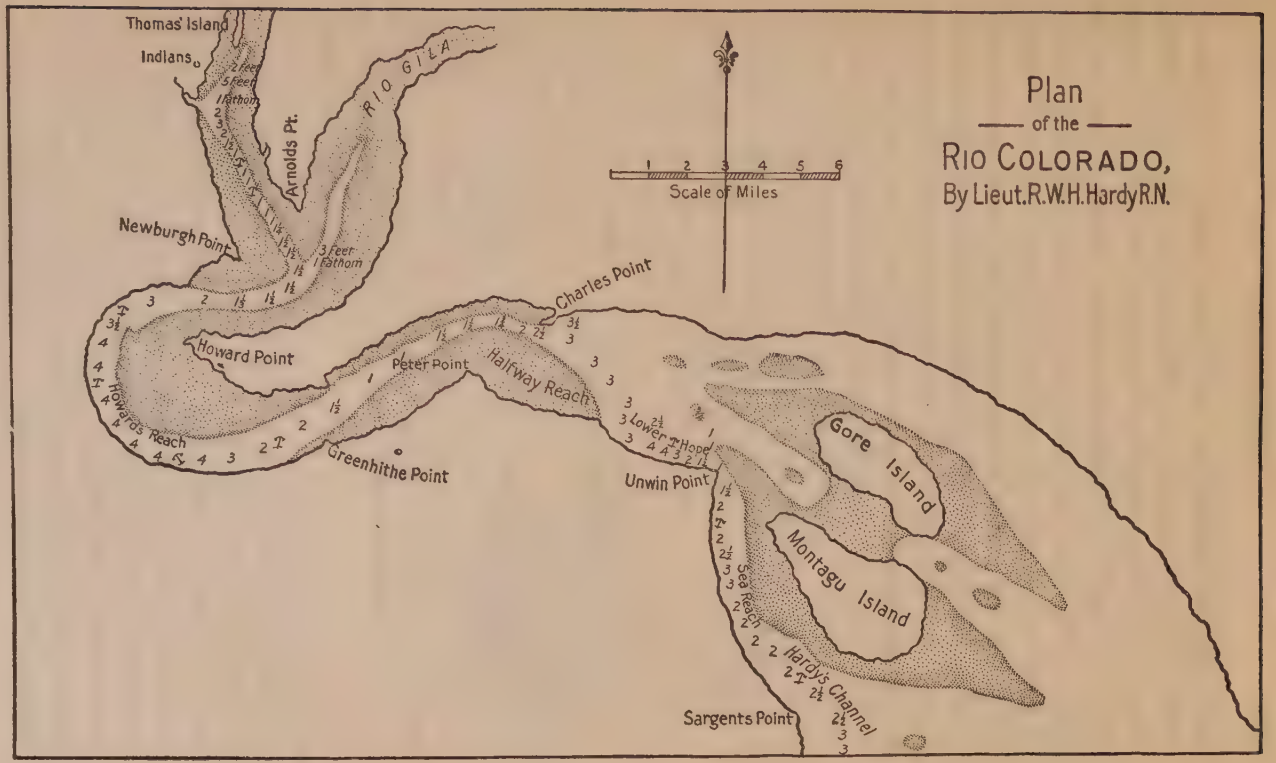
It has been the persistence of such erroneous statements that has so misled people in regard to the facts.

During the excitement caused by the overflow of the Colorado River into the Salton Sink, in 1890, readers of the newspapers saw many references to the river known as Hardy's Colorado. A vast amount of *mis*information has been generally disseminated about this river and how it came by its name.

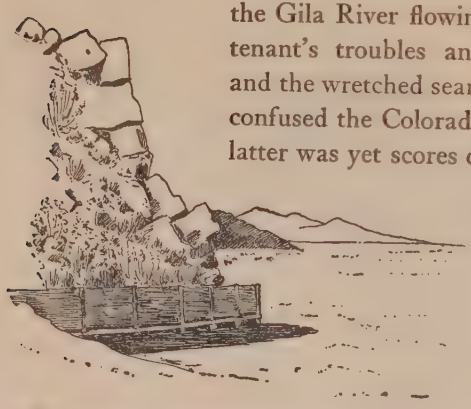
R. W. H. Hardy was a lieutenant in the Royal Navy of England. In 1825 he was engaged in the capacity of a Commissioner by the General Pearl and Coral Fishery Association of London to visit Mexico and report upon the pearl and coral fisheries of that country. In the discharge of that duty he made extensive travels in Mexico from 1825 to 1828, and in 1829 published in

Church at Palm Springs

London a full account of his experiences. He embarked at Guaymas and investigated the pearl fisheries of the Gulf of California. He was interested in exploring the head of the gulf, as he had been informed that an Italian priest had brought away, as the result of two months' work, $200,000 in native gold and pearls. The gold had been washed down by the Colorado River and was to be picked up by the bucketful. As he neared the head of the gulf, Lieutenant Hardy says he determined to "stand out more into the middle of the gulf, by which means I hoped, at daylight, to get sight of the Rio Colorado, into which I wished to enter for the purpose of procuring a supply of provisions from the Indians, and *of picking up gold dust at the same time.*" The poor lieutenant had a hard


Plan
of the
Rio Colorado,
By Lieut. R.W.H. Hardy R.N.
Scale of Miles
1 2 3 4 5 6
Thomas' Island
Indians
Arnolds Pt.
RIO GILA
2 feet
5 feet
1 Fathom
3 Feet
1 Fathom
Newburgh Point
Howard Point
Peter Point
Halfway Reach
Charles Point
Howards Reach
Greenhithe Point
Lower Hope
Unwin Point
Gore Island
Montagu Island
Sea Reach
Hardy's Channel
Sargents Point

time. His captain and crew were about useless, and in spite of all his endeavors he came near having a shipwreck, owing to the sandy shoals at the mouth of the river. These shoals bothered him exceedingly, as they have done every other navigator of the region. He could not realize that the vast amount of sandy silt being constantly brought down by the Colorado rendered charts of ten years or more ago useless. Finally he reached what he supposed was the Rio Colorado, and he describes its three mouths and also the troubles he had with the strong ebb and flow of the tides. He also gives a map, here reproduced, showing what he conceived to be the Colorado with the Gila River flowing into it. In the lieutenant's troubles and worries over the tide and the wretched seamanship of his sailors he confused the Colorado with the Gila, which latter was yet scores of miles above, and took for the Colorado a smaller and, as yet, unnamed stream coming in on the west. When, after the publication of his map, it was found what an error he had made, it became customary to refer to this unnamed river as *Hardy's Colorado*, a name it has retained to this day.



Aqueduct rounding one of the spurs of the San Jacinto range

It is scarcely necessary to add that the distinguished lieutenant did not get the gold he expected. He reports the sand to be "full of a glittering sort of tinsel, which shines beautifully when the sun is upon it." For twenty-six days he navigated the "Rio Colorado" and departed at length satisfied that he knew a great deal about the region. Such is fame, and such is the history of the origin of the name "Hardy's Colorado."

Perhaps I may be pardoned for here calling attention to a

matter that is somewhat personal. In one sense it is so, yet in another it is more than personal. It is in regard to pictures of the desert used by other authors to illustrate their works. The one picture that appears as a frontispiece to John C. Van Dyke's "The Desert" was made by my photographer, George L. Rose, under my direction, when he accompanied me to the Hopi villages. It is of that part of the Painted Desert overlooked by the road which ascends from the valley of the Little Colorado River between Volz's Crossing and his store at The Lakes.

In Burdick's "Mystic Mid Region" the photograph on page 3 was made under similar circumstances by my friend C. C. Pierce of Los Angeles, who accompanied me to photograph the Hopis and the Snake Dance at a later date. The picture was first used by me as the frontispiece to my "Indians of the Painted Desert Region." In this same book of Mr. Burdick's are sixteen other photographs of my own taking.

These facts serve to indicate that I have helped others make this fascinating region known to the world at large.

Some words on the desert have a meaning peculiarly their own. For instance, the word "inside" refers to the region away from the desert. "Where did you get these eggs?" you ask. "They came from inside!" is the reply. If you inquire where the miners buy their provisions they will tell you, "I don't often buy on the desert, I generally buy from inside," thereby meaning the towns of the inner country, as Colton, Riverside, San Bernardino, Los Angeles, etc.

These pages gather together the loose threads of twenty-five years of desert observations and experiences,—not all of them confined to the Colorado Desert. In making this book, however, I found such a wealth of material, much of it peculiar to the Colorado Desert, that I decided to confine myself, as far as geographical boundaries were concerned, to its comparatively limited area.

From many sources I have received help. Miners and prospectors, railway section-men, homesteaders, farmers, woodmen,

students, artists, naturalists, editors, county officials, and surveyors, as well as various writers, have given valuable suggestions, and to all of these I tender my hearty and cordial thanks.

Especially do I wish to record my gratitude to my venerable friend, Dr. Wellwood Murray of Palm Springs, the friend of Thomas Carlyle, Adam and Charles Black, the Chambers brothers and other literary notables of the Edinburgh of fifty years ago. From this center of culture he came to the desert, and for thirty years has studied it, worked over it, and sought to understand its mysteries and penetrate its secrets. Without reserve Dr. Murray has poured forth the wealth of his personal experiences and given of his valuable suggestions.

To Dr. Walter T. Swingle, Physiologist in charge of the Laboratory of Plant Life Industry in Washington, D.C., I am also indebted. Dr. Swingle is much interested in the Salton Basin, and it is to this interest we owe the establishment at Mecca of the government's experimental date farm.

The desert itself, however, has been my chief inspiration. Upon its northwestern edge I have a camp of my own. Within five and a half hours' ride from my Pasadena home, where library and pictures and piano and flowers and birds and congenial society all conspire to keep me (even were there no loved ones in the home itself), I have found this desert a resting place. Up in a canyon, on the northeastern slope of the great San Jacinto range, where seeping water makes a "cienega" and gives life to a good sized patch of grass; where a little extra pasturage can be found for my mules and burros; where some one, sometime, planted a fig tree, which has grown to rugged maturity and rich bearing; where there is a hot spring to bathe in, and a cold spring to drink from; sheltered on one side by one of the steepest, if not the steepest and highest wall in the world, and on the other with an outlook over illimitable wastes of desert land, here is where I love to come and rest, think, and write.

Solitary? No! Why should I be solitary, even though no other human beings are with me? Solitary in company with a majestic mountain that speaks a mystic tongue that I am slowly learning to comprehend; with a hot spring gurgling

Volcanic upthrust of San Jacinto Mountains

every moment of wonders in the earth's interior that I can only guess at; with a cold spring not a hundred yards away that tells of cool

mountain heights, where snow-banks lie all the year around, even though the hot blasts from the desert try to reach and destroy them; with friendly burros to come and seek for titbits from the table and act more human than most of the humans who have become over-civilized in cities; with the coyotes looking so wise and yet cowardly, so impertinently yet so sneakingly at you; with tiny lizards darting to and fro and perking their heads on one side so cunningly at you; with an occasional rattlesnake to watch, to follow, and to kill; with the mountain-sheep to peer down upon you from inaccessible mountain heights as if despising you for being so civilized as to be content to live in places where you can move about with ease; with the hoarse growl of the mountain lion occasionally in your ears, and the sniff, snuff, woof of the bear now and again as an accompaniment; with the murmur of the tiny stream flowing away from the springs and pathetically telling of its own speedy death in the sandy wastes below; with the quaint palms, standing like graceful sentinels making profound obeisance, near by,—can one be solitary with such companions as these, especially when, in addition, he has such stars and skies as the city dweller never sees; such an horizon as only the desert dweller knows; such sunrises and sunsets and morning and evening glows as only angels can understand the glory of; such silences; such voices out of the far away; such weirdness; such mystery; such winds; such storms; such calms? Ah, no! there is no solitude in such presences, for is not one with himself, with his ideals, with his dreams, with his ambitions, with the great ones of the past and the great ones of the future, with the achievements and life of the ages, and, better than all, with the source and origin of it all, with God?

No! No! I have felt more solitary and alone, more utterly desolate and forsaken, when walking through the streets of London and Paris, New York and Chicago, than I have ever felt in all my years of desert experiences.

I go to the desert with specific objects in view. I go for health, for inspiration, for work. The desert is God's great health-giving

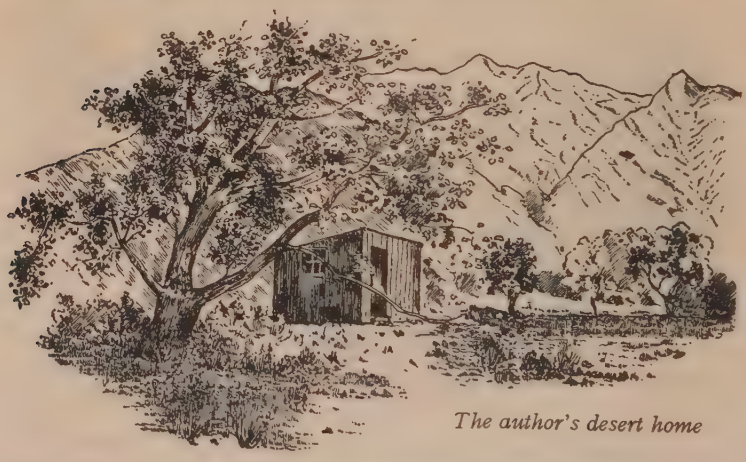
laboratory. It is the manufactory of health where are to be found purest sunshine, purest air, purest soil. Disease flees away in such presences. With the freedom of the wild animals one sleeps on mother Earth's bosom and absolutely, literally, positively draws life and vigor from her maternal founts, — draws it in through every possible avenue; every pore of the skin drinking it in with eager avidity.

Come with me to my desert home. The house is only a rude lumber shack with one room, in which is a cook-stove, a table, a few utensils, and a couple of chairs, — the latter rude, home-

Outlook from the author's home in Chino Canyon

made affairs. "But," you ask, "don't you have a sleeping-room?" Certainly! Here it is! Did you ever see a more wonderful one? I have been in the palaces of Windsor and Buckingham and Sandringham and Versailles. I have slept in the palace bedrooms made by kings for their queens and mistresses, where costly decorations worth a great general's ransom give rich grace and elegance to the scene. Yet not all of them combined can compare in perfect beauty and profuse adornment with this of mine. And large? It is so large that these kingly palace bedrooms appear mean and insignificant beside it. It reaches for miles and miles to the north, even as far as the Aurora Borealis; to the south, to its pole; to the east, to the rising sun; to the west,

to where the sun bathes in the ocean of the sunset, and its ceiling is millions of miles high, decorated by the Master Artist himself with moons and planets and wandering stars set in a vault of such matchless blue as makes pale and faded the Tyrian blue of which Solomon was so proud. And its ventilation! How often have I longed for that system of ventilation when vainly tossing to and fro on comfortable beds in rooms equipped with the most elaborate and expensive of man's artificial ventilating apparatus. Here the air is always fresh and pure, bracing and stimulating, and at night-time, except in the heat of summer, can

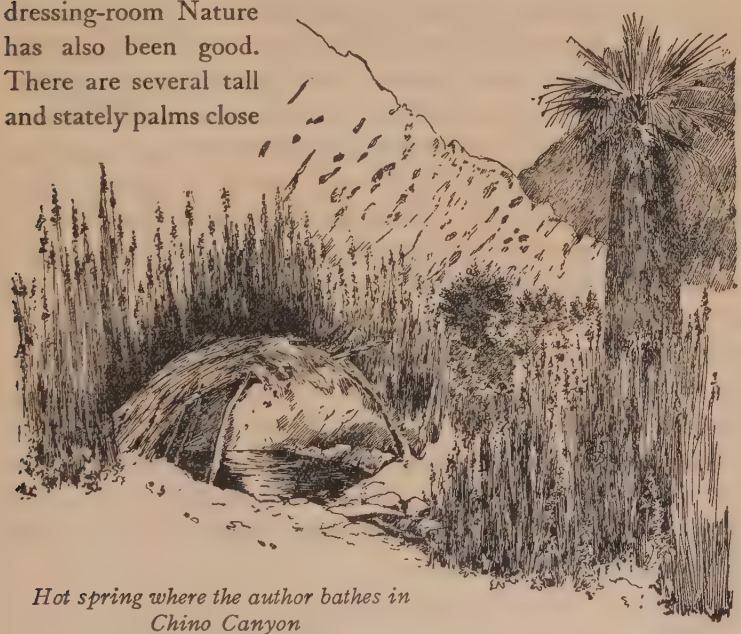


The author's desert home

be described only by the one word, "delicious." It feels good to be alive in such air; every part of the body responds to the good feeling, the hands and arms are allowed to rest outside the bedclothes, the head and neck are exposed, the feet kick away the covers, and both before and after going to sleep one again and again lets the air flow in and caress the whole body. This is to take in life and energy in large quantities, this is to drink in vim and creative power from the fountain-head.

Then my morning, afternoon, and evening bath! There is nothing like it that I know of anywhere else in the world. We have read of Cleopatra's baths in asses' and camels' milk, and

various sybarites of all time have indulged in costly luxuries in the way of baths, but none of them ever equaled mine. The water is always on tap and always hot. It comes bubbling up out of the rocks and sand at the rate of several score gallons an hour. The rocks form a natural bath-tub which the Indians of the region have thoroughly cleaned out; then we have had it covered with beautiful palm-leaves, — great, flat-surfaced, natural thatch, —and now ten or fifteen people can bathe in it at one time. For a dressing-room Nature has also been good. There are several tall and stately palms close



Hot spring where the author bathes in Chino Canyon

by, the leaves of which make as good flooring and carpeting as one desires out in the desert, and the palms are so large and outspreading and are so arranged that several dressing-rooms are provided, where, in perfect seclusion, one may don his (or her) bathing suit. But when I am alone I need no other suit than that provided at my birth. Now, into the bath! Gently at first, for the water is over 100° Fahrenheit, and that is hot, but the body soon becomes accustomed to it. Yes! accustomed to and delighted with it. You lie

down, and the water, charged with gases and bubbling up from below, strikes your body, and you feel as if you were having a bath in hot champagne. The pool is large enough to float in, and with the body partially in and partially out of the water the sensations are delicious. When you have had enough, out you come, and oh, what a surprise! The difference in the temperature of the air and that of the water seems as if it would chill you through. For as long a time as a plunge in and out of a swimming tank after you have taken a Turkish bath, you feel the cold shock of the air, then, gradually, there diffuses over the whole body, even while you are still drying yourself and exposed fully to the atmosphere, a delicious sensation of warmth and stimulus that can be neither described nor imagined. I never felt anything like it in any bath I have ever had, and I have been through complete courses in various hydropathic establishments of Europe and America as well as shared in the varied baths of our aborigines. The whole being seems exhilarated; you want to run and shout and work; your brain is as alert and active and anxious for work as is the body of a chamois, and when night comes you feel that that day at least has been full of physical and mental joy. You compare your lot with that of Bismarck, who, at eighty, wrote that in the whole of his life he had never known twenty-four hours' happiness. Poor fellow! Poor wretch! Here have you had almost twelve hours of pure, unadulterated happiness in one single day.

George Wharton James

Chino Canyon,
Colorado Desert,
October, 1906.

CARL EYTEL

The Artist of the Colorado Desert

LONG ago in the Royal Library at Stuttgart, Germany, a quiet, studious, reflective boy, the son of a Lutheran minister of an adjacent village, might have been seen poring over Humboldt's vivid descriptions of California and the deserts he had to cross to reach it. The impressions then received remained deeply lodged in his inmost heart.

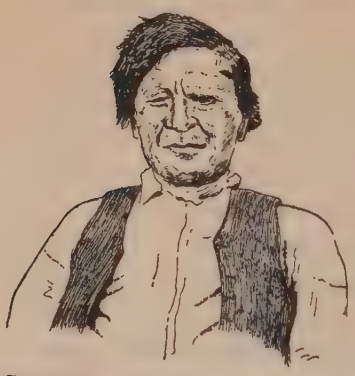
He had the artistic instinct, had this lad. He was especially fond of cattle, and two of the ambitions of his earliest years were, first, that he might see the great deserts of the West; and second, that he might paint them and his beloved cattle.

It was not strange, therefore, that when he left home he should aim as directly as he could for the region of his many dreams.

His first year and a half in the United States were spent in Kansas, where he worked on a cattle ranch, gaining that infinite knowledge of cattle which he knew he must attain for his art. Then he struck out for California, still keeping his ambitions in mind. He followed the plow, drove the hay-wagon, pitched hay, and did all the thousand and one little things that a handy man is set to do on a ranch, all the time longing for the day to come when he should be free to devote more time to the study of art. Secretly and with inward trepidation lest he be found out, for he was always shy and retiring, he spent his evenings, when possible, in sketching and trying to teach himself how to paint. Like Lincoln, reading by the light of his open fire, he spent many an hour, when he should have been in bed, grappling unaided with the first problems of drawing and painting.

For a year and a half he engaged himself to work in a slaughter-house, as he could find no other occupation where he could earn his livelihood and study cattle at the same time. Here he rode after them as a cowboy, — went on the roads, — assisted in cutting them out, branding and separating them, and many a bout has he had with the wild Texas steer when driving them to the slaughter.

A more congenial though less exciting occupation was found when he was engaged to drive the mule that pumps water for the cattle on the great Miller and Lux ranch near Bakersfield. For six months he followed this monotonous daily round, but his eyes were ever on the cattle. He studied them under every condition, and at every stage in their history from birth until they were driven to the cars or the slaughter-house. And when night-time came, with pen or brush, he would seek faithfully to reproduce on paper or canvas what had most impressed him during the day.



Saturnino, a Palm Springs Indian

As soon as he had saved up a little money he bought a stock of colors, brushes, canvases, pencils, drawing-paper, and provisions and made a bee-line for the desert. There he roamed and painted, sketched and studied, until food and funds gave out, when he went on to Arizona and there resumed his occupation. Every time his wages seemed large enough to justify another desert trip he resigned his employment and went back to his painting and rambling, and this continued for another two and a half years.

With this interesting territory, so new in all its life to the gently nurtured boy, he soon became fascinated. He loved its great plateaus, its forests, its vast plains, its marvelous canyons, its

Photo. by George Wharton James

MR. CARL EYTEL, THE DESERT ARTIST, MR. LEA VAN ANDERSON, AND THE AUTHOR'S FAITHFUL PACK-BURROS

glowing colors, its majestic mountains, and its singular plant life. The wildly picturesque life of the cowboy appealed to him, though he naturally revolted at the coarseness and excess too many of the fraternity indulged in. He began to write sketches to his home papers in Germany of this life as he found it, and illustrated his stories with drawings from his own pen and brush. Then he began to send articles and sketches regularly to the *New Yorker Staats Zeitung*, and he soon gained a host of friends by these simple and unpretentious, but real and truthful accounts of life on the frontier.

His own life, however, still remained strenuous and arduous. Many a time the battle seemed to be too hard, the difficulties to be overcome too great, for the poor and almost friendless youth. For, while he was friendly enough, his reserved habits and refusal to enter into the gay and extravagant carousals of his fellows did not tend to make him popular with them, and he was as shy about revealing his secret as a maiden is about telling of her first love, so that they could not have sympathy with a longing they might have admired had they known of its existence. Sometimes he felt inclined to give up his ambitions. The years were rolling along and he was accomplishing so little. Still he kept at it. Then doubt and despair tugged at his heart-strings until he was utterly despondent. But brighter days would come when all his resolutions and hopes would return. And so he has gone on until now, for fourteen years, he has lived much of the time on the desert. He has traversed its plains and climbed its mountains, breathed its parched atmosphere, mingled with its children, — the desert Indians, — studied its features, its plants, its birds, its reptiles, and its animals, and has become familiar with it in all its moods. In fact he has become a veritable "son of the desert," as much as any Bedouin that roams the Sinai peninsula, or a camel-rider who journeys from the Oued Souf to the Mediterranean.

From the heights of its mountains he looked into the great solitudes of the desert below and watched the changing colors revealed

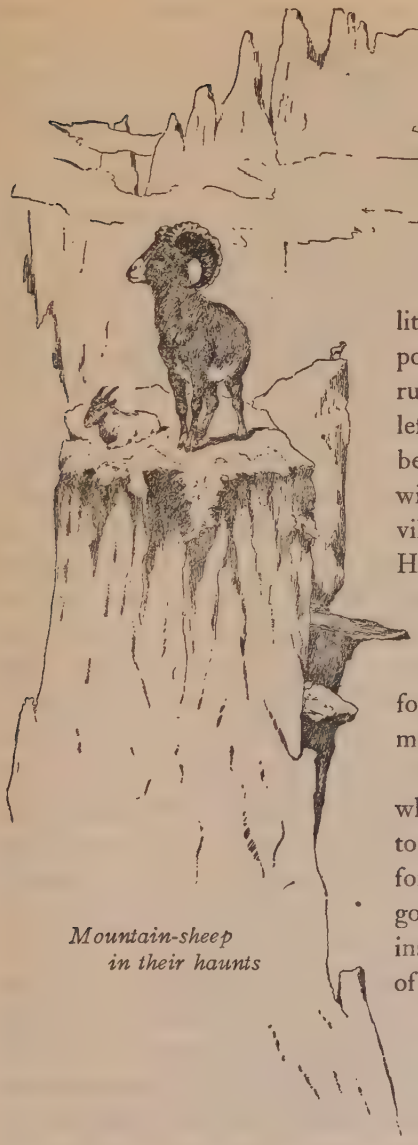
in tawny sand, green oasis, or rocky slope on the opposite side. He saw such shadows as only God and the angels see; for man seldom thinks of such unsubstantial things as shadows, save and except such men as Eytel.

He studied the desert animals, the mountain lion, mountain-sheep, wildcat, coyote, chipmunk, and squirrel, and then watched the birds, the eagles, the hawks, the herons, the pelicans, the gulls, the mocking-birds, the doves, the vultures, and even the rare and seldom seen, almost extinct condor. He also learned the peculiarities and habits of the chaparral cock, or road-runner, that singular bird that is generally seen only when running away from human beings. With outspread wings and long rapid strides he rushes with great speed away from the stranger, stopping once in a while to give his tail a characteristic upward jerk, as much as to say, "I'll wave you a parting salute," then he dodges behind a bush or a sand-hill and is lost to sight. But Eytel followed and made friends with him, and was thus able to watch him at his toilet, when he preens his feathers, takes a sun or sand bath, etc.

Together Mr. Eytel and I have made trips where few white men have ever been and where our only trails were made by mountain-sheep, deer, or antelope.

Scores of the sketches in the following pages were made when he went alone, hundreds of miles at a time, over our American Sahara. Afoot, last midwinter, he made one trip of 400 miles,—thirty days of weary trails, of danger, hardship, hunger, thirst, solitude, and arduous toil. His itinerary was through a region largely devoid of vegetation or water. He had to provide for food, drink, and sleeping accommodation at the beginning of his journey. This meant the carrying of a pack which included provisions, water, and blankets. The water-holes and wells are from twenty to forty miles apart on the Colorado Desert, and a canteen of water is a heavy load to a walking man, especially when he has sandy or steep, rocky trails to go over.

In speaking of his experiences he is always modest and reserved. Yet they have been varied and exciting. Once he was seeking a



Mountain-sheep in their haunts

little Indian village for the purpose of making sketches of its rumored picturesqueness. He left the ranch at which he had been passing a few days, loaded with directions for finding the village—and with nothing else. He was assured that he could not miss the way and that he could get to the village that day, so he took neither food nor water, weapons nor matches.

There was a trail to follow which was to lead him straight to his destination, but the path forked, and his friends had forgotten to tell him of it and to instruct him as to which branch of the trail to follow. This led him down into a deep canyon, and the canyon tolled him on to finally bring him to an insurmountable wall. The greater part of the day was passed in getting out of this granite trap.

When once again he found himself upon the level plain he was thirsty, hungry, and nearly exhausted from climbing the steep walls of the canyon. He felt that the safest plan to pursue was to return to the ranch which he had that morning left, and start anew for the Indian village another day.

Near this ranch was a mountain of peculiar formation. He saw before him such a peak and mistook it for the one near the ranch. He started on a bee-line for this mountain. A couple of hours' brisk walking brought him to the rim of another canyon which blocked his way. The canyon extended as far as he could see in either direction, so he sought and found a point where he could descend into it, thinking to clamber up on the other side and pursue his way toward the mountain.

Night came on and he was obliged to wait for morning to prosecute his search for a place of exit. When daylight came he wandered up and down the canyon vainly seeking a point which he could scale. He was finally obliged to retrace his steps and climb out on the side he had entered. He then followed down the rim of the canyon, hoping to find a trail which would lead him to some habitation. About this time his light shoes gave out and he was forced to discard them. The way was rough and the stones cut his feet till they bled freely and he found it impossible to proceed in that manner. He then removed his undershirt, cut it in two pieces and bound them about his feet. He found it difficult to keep these makeshifts in place and his progress was exceedingly slow. The torture from hunger and thirst was becoming fearful, and to cap the climax of his misfortunes he lost his knife, the only implement he possessed.

That night he stretched himself out upon the plain to obtain such rest as he could and to await the light of another morning. Before sleep came to him a wild turkey came strutting near and passed within a dozen feet of him. This display of live meat was very tantalizing to the famishing man, but he was powerless to kill or capture the bird.

The fourth day of his wanderings he came to a deserted ranch-

Photo. by George Wharton James

MR. EYTEL AT WORK ON THE DESERT

house near which was a water-hole where he quenched his tormenting thirst. Then he approached the house and looked in at the open door. Half a dozen wild doves had taken refuge therein. Startled at the appearance of a human being they darted out, almost in his face. Eytel leaped in and closed the door in time to make one prisoner. After a lively chase he succeeded in cornering the bird and capturing it. It was but the work of a moment to wring its neck and strip it of its feathers, and he then proceeded to devour it raw. He declares it the best meal he ever ate.

While he was yet at this repast he heard the clatter of hoofs, and hurrying to the door he beheld one of the cowboys from the ranch he was seeking. He hailed him and learned that the ranch was but a few miles distant. The cowboy gave him his horse to return with, and in a short time he was safely housed among his friends. It took him two weeks to recover from the effects of his experience.

On another occasion he was taken for a noted desperado and horse thief and came near being hanged. He had been sketching in the mountains and was overtaken by night. He was just approaching a ranch-house in the valley and was about to enter the gateway and ask for food and lodging when a pack of dogs rushed out and with loud barking surrounded him. The dogs were followed by several men and boys, all armed, and he was commanded to "throw up his hands!" which he promptly did. A light was brought and he was closely questioned as to his business in that locality at that time of night. His explanations were received with scorn. In vain he showed his sketches. They were mere attempts to "throw dust into the eyes of the fools who could be thus easily deceived." Then one of the men recognized him as a noted desperado, and still another was sure that the horse he was riding belonged to a neighboring rancher. This was enough. To be a horse thief on the desert is to court certain death. A vigilance court was organized and a speedy trial held. Eytel's pleas were in vain. He was condemned to death. Then

some one suggested that the owner of the horse, as a matter of courtesy, should be invited to the hanging, and the execution was stayed while a messenger went for him. In due time he arrived, bringing with him another half-dozen men and boys to assist in the operations, but when everything was ready, and the culprit was brought forth, the astonished rancher exclaimed, "Why, this is not the man!" When the supposedly stolen horse was brought he likewise disclaimed all knowledge of it. This put a stop to the execution for that night. The "court" thought it would better suspend sentence until morning. Fortunately the sheriff of the county arrived the next day hot on the trail of the noted horse thief. In a moment he quenched all doubt as to Eytel being the man he wanted by calling the wiseacres "a set of very blank fools." The prisoner was therefore released with many and abject apologies and allowed to resume his rudely interrupted journey.

In regard to Mr. Eytel's work, it should be said that he is almost entirely self-taught. As such his work must be judged. The pictures of this book are his first pretentious attempt. I think they reveal genius as surely as they give proof that he has a persistence in the face of obstacles that would daunt most men. He knows the Colorado Desert as no other man knows it, and his sketches are faithful portrayals of objects he has seen and lived with. I could tell many stories of his persistence in obtaining the knowledge he sought, of days and nights of hungry, thirsty, weary following of trails to see a rare sight, or learn a new thing.

While Mr. Eytel (with the modesty that is one of the flowers of his character) would disclaim any right to be regarded as other than the artist of the book, I cannot do him the injustice to allow its readers to assume that I am the sole author of its literary contents. While I have done the actual writing, many pages of that which is written belong to Mr. Eytel, and I wish him fully to share in any praise which that portion of the book receives just as much as I wish him to be the sole recipient of all the praise for his beautiful sketches.

The Wonders of the Colorado Desert

CHAPTER I

A General View of the Desert

BEFORE entering upon a detailed description of the desert in its various aspects it is well to obtain a broad and cursory survey of its general appearance. It must not be supposed that the Colorado Desert is a flat, level plain of barren sand. It is more diversified in feature than many of the Middle States.

Approached from its northwestern side over the San Gorgonio Pass the desert presents a far more barren, desolate, and forsaken appearance than when the traveler has been prepared by crossing the long sandy stretches of Western Texas and Arizona. The contrasts are very marked between the alkali flats, sand areas, and sand mountains, colorless desert verdure, volcanic peaks, unclothed foot-hills, and mountains that seem to be absolutely barren, and the orange and lemon groves, peach and apricot orchards, stock ranches, alfalfa farms, and bright, cultivated, flower-bedecked areas of Southern California.

The ascent from Colton is easy and gradual for about thirty miles until the summit is reached. Here let Clarence King tell us what is to be seen:

"There are but few points in America where such extremes of physical condition meet. What contrasts, what opposing senti-

ments, the two views awakened! Spread out below us lay the desert, stark and glaring, its rigid hill chains lying in disordered grouping, in attitudes of the dead. The bare hills are cut out with sharp gorges, and over their stone skeletons scanty earth clings in folds, like shrunken flesh; they are emaciated corpses of once noble ranges now lifeless, outstretched as in a long sleep. Ghastly colors define them from the ashen plain in which their feet are buried. Far in the south were a procession of whirlwind columns slowly moving across the desert in spectral dimness. A white light beat down, dispelling the last trace of shadow, and above hung the shield of hard, pitiless sky.

"Sinking to the west from our feet the gentle golden-green *glacis* sloped away, flanked by rolling hills covered with a fresh, vernal carpet of grass, and relieved by scattered groves of dark

Banning

Mounts San Jacinto on the right and San Gorgonio on the left

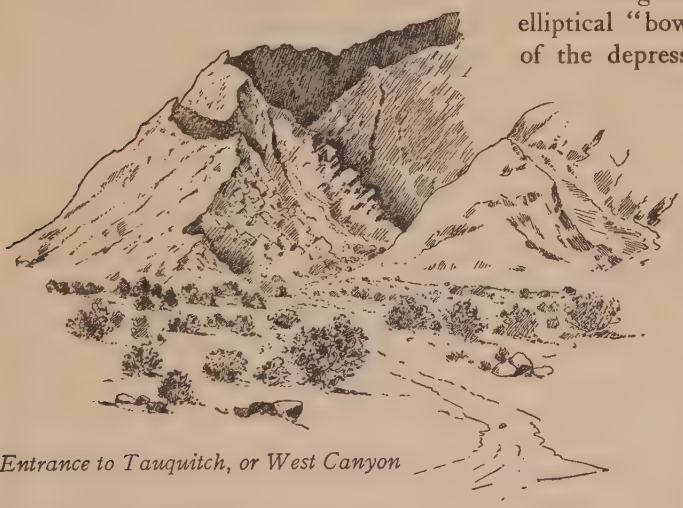
oak trees. Upon the distant valley were checkered fields of grass and grain just tinged with the first ripening yellow. The bounding coast ranges lay in the cool shadow of a bank of mist which drifted in from the Pacific, covering their heights. Flocks of bright clouds floated across the sky, whose blue was palpitating with light, and seemed to rise with infinite perspective. Tranquillity, abundance, the slow, beautiful unfolding of plant life, dark, shadowed spots to rest our tired eyes upon, the shade of giant oaks to lie down under while listening to brooks, contralto larks, and the soft, distant lowing of cattle."

Thus wrote the poetic geologist after journeying over the desert.

Let us now begin our journey, but in the opposite direction from that which he took. Flanking the pass along its northern side stands the peak of San Bernardino with its glorious companion, San Gorgonio, their granite framework crowded up above the

beds of more recent rock about their bases, bearing aloft tattered fragments of pine forest, the summits piercing through a marbling of perpetual snow, up to a height of over eleven thousand feet. Fronting them on the opposite wall rises their compeer, San Jacinto, a dark crag of granite, with upthrusts of lava, whose flanks are cracked, riven, and waterworn into innumerable ravines, each catching a share of the drainage from the snow-cap in springtime, but in summer and autumn dry and thirsty looking.

Both these mountains have extensions which trend from the northwest to southeast, and which form the two elongated sides of the irregularly elliptical "bowl" of the depressed



Entrance to Tauquitch, or West Canyon

portion of the desert. The northwestern end of the ellipse is the San Gorgonio Pass. The southeastern end has no very elevated edge, though there is a slight ridge of sand here and there which gives the appearance of completing the ellipse.

Mount San Jacinto begins a grand range of mountains that edges the desert down to the boundary line between the United States and Mexico and then forms the backbone of the peninsula of Lower California, while the Sierra San Bernardino continues in broken-up masses to within twenty or thirty miles west of the Colorado River near Yuma.

Geologists tell us there is a distinct difference between the rocks

on each side of the San Gorgonio Pass, thus clearly suggesting that they are not of similar origin or age and are, consequently, of different systems. The pass, therefore, is not a low ridge in a homogeneous mountain chain, but the point of contact between two different ranges.

The slope on the eastern side into the desert is gradual and covered with rocky detritus washed down from the mountains. For over twenty miles the pass is so filled with boulders, pebbles, and gravel that it might almost be taken for the course of a vast waterspout. At about Whitewater Station, on the line of the Southern Pacific, the desert seems to begin in earnest, though there are still many shrubs and plants, and after a heavy rain the ground is fairly bespangled with beautiful flowers.

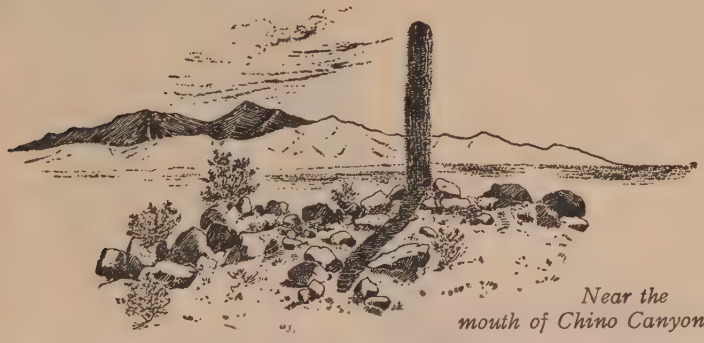
Standing here, too, one first becomes familiar with that breeze of the desert that comes as out of the very Dawn, pure, undefiled, and with the power of God in it, and one drinks in its celestial purity with eagerness and gratitude.

On the left the peaks of the San Bernardino range seem to retire farther away from us in solemn majesty, snow-clad, serene and sublime, while the lower hills that help make the pass are broad and wide, reaching to the other side with a gentle and beautiful slope.

On the right, the massive bulk of San Jacinto seems to have been thrust up right from the floor of the desert and arrested the quiet slope of the opposite range. Great spurs are thrust out from the base of the mountain, as if the intention had been to make arresting barriers to our farther progress, but they do not project far enough, so our train passes them and the far stretch of the desert ahead is exposed to our view.

It is a sandy waste, dotted everywhere with a variety of unfamiliar shrubs and plants, yet we find its features are strange and diversified in spite of its desert character. The two great ranges of mountains are seamed with canyons and ravines, and the irregularities of their surfaces cast purple shadows, giving to the masses a peculiar dimpled appearance which is exceedingly vivid. As we progress farther down the slope we find that for a distance of possibly fifteen miles, namely, from Indio to Mecca, the whole region is a beautiful oasis, owing to the fact

that artesian wells in large numbers have been bored, and the soil is of such fertile character as to grow most productively when under irrigation. This is the world-famed Coachella Valley, yet the name "Coachella Valley" is a misnomer. It was originally Conchilla Valley, and is so named on the maps of the United States Geological Survey. Conchilla means "little shells," and the name was given in early days from the fact that the whole valley of the Salton from the Mexican line as far north as Indio is covered with tiny fresh-water shells. Strangers, unfamiliar with the name and unacquainted with the Spanish tongue, mispronounced and misspelled the name, and, as they were the earliest white settlers, their methods soon established the custom, which it is not likely any one will now try to disturb.



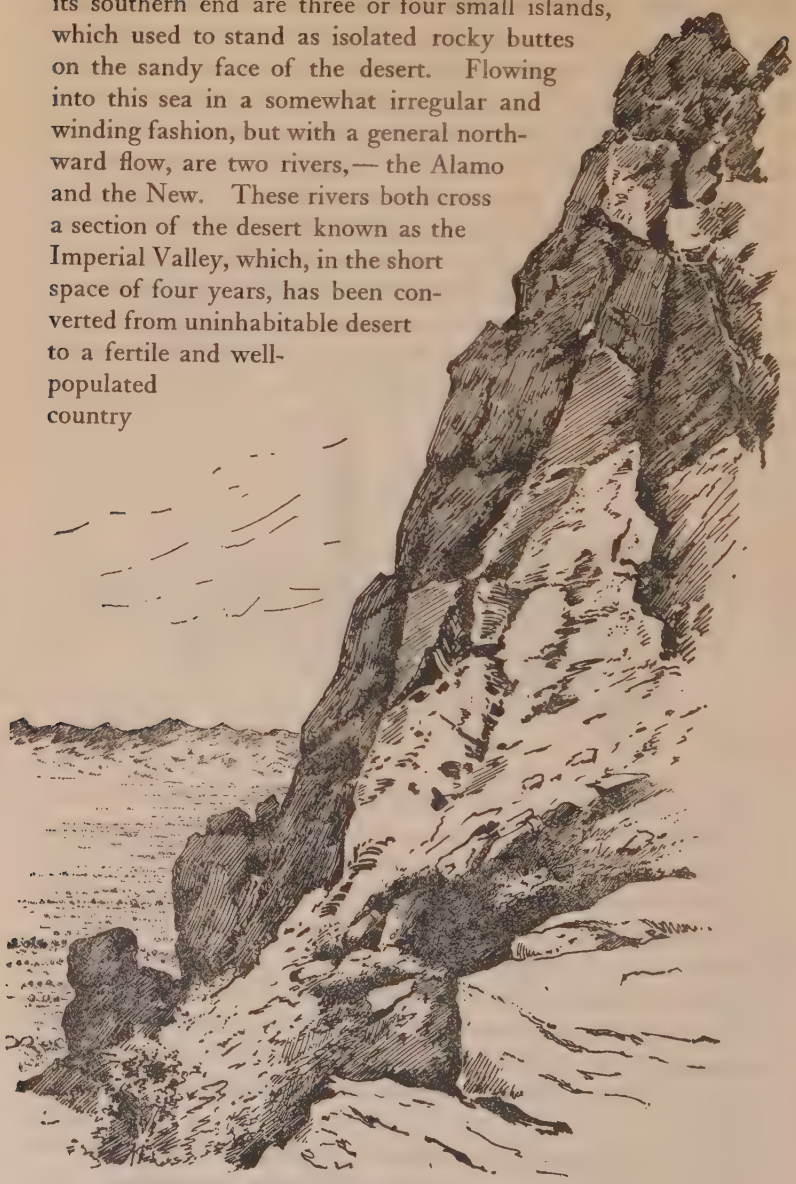
Near the mouth of Chino Canyon

Below Mecca the whole scene changes and the eye is fascinated and charmed with the presence of a vast inland sea. Can this really be a body of water or is it only a fiction of a disordered brain? We have long seen that we have been below sea-level, and the levels of the old beaches are clearly visible at more or less irregular intervals on each side of the valley.

We are now in the region known as the Salton Sink, and the body of water before us is the Salton Sea, the mysterious inland ocean which has given rise to so much foolish and imaginative writing by those who have never taken the trouble to investigate its origin.

At the present time of writing (June, 1906), this inland sea is over forty miles long and from five to twenty miles broad. At

its southern end are three or four small islands, which used to stand as isolated rocky buttes on the sandy face of the desert. Flowing into this sea in a somewhat irregular and winding fashion, but with a general northward flow, are two rivers,— the Alamo and the New. These rivers both cross a section of the desert known as the Imperial Valley, which, in the short space of four years, has been converted from uninhabitable desert to a fertile and well-populated country



The left wall at entrance to Tauquitch Canyon

by means of irrigation. All around this valley, as well as the upper portion of the desert, aligning and above the Salton Sea, the limits of the ancient beach line are to be seen. In some places this beach is composed of immense sand-dunes and ridges, and in a few cases these sand masses are large and imposing enough to be entitled mountains.

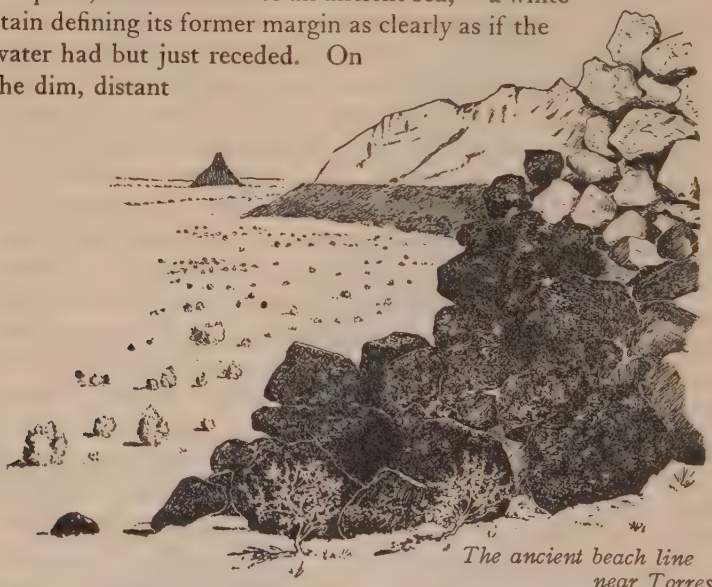
It is commonly believed that the valley region I have here described, from the San Gorgonio Pass to the Mexican line, bounded by the San Bernardino and San Jacinto ranges, comprises the whole of the Colorado Desert. This is a mistake. The desert conditions exist far beyond the confines of this limited area. The mountains of the San Bernardino range, though they seem to present insurmountable barriers, in reality have a number of passes, through and over which one may enter into the regions beyond. And what of these? They comprise a succession of mountains and valleys of all sizes, contours and forms. The valleys separate these mountains in most irregular and haphazard fashion. Some are narrow, some are broad and all are of different lengths, yet all alike are barren and desolate save when the winter rains bring forth marvelous carpets of flowers. Here, away from the vivifying water, everything is gaunt, harsh, and desolate. There are few signs of life. Everything is silent and still. During nine months of the year, save for the solitary eagle and the almost forgotten condor, which float noiselessly in the serene blue abyss above, there is never a sign of life, except when the weary prospector and his patient burro take up their plodding march from one water-hole to another.

On the opposite side the San Jacinto Mountains are not quite so barren and sterile as those of San Bernardino, yet they are desert enough, as the chapters devoted to our trips over them will show.

The appearance of the desert from the divide on the old stage road running from Yuma through the San Gorgonio Pass is thus graphically described by Clarence King. He was looking up the desert to the northwest from a point a little south of Imperial Junction:

"We were on the margin of a great basin whose gently shelving rim sank from our feet to a perfectly level plain, which stretched

southward as far as the eye could reach, bounded by a dim level horizon, like the sea, but walled in to the west, at a distance of about forty miles, by the high, frowning wall of the Sierras. This plain was a level floor, as white as marble, and into it the rocky spurs from our own mountain range descended like promontories into the sea. Wide, deeply indented white bays wound in and out among the foot-hills, and, traced upon the barren slopes of this rocky coast, was marked, at a considerable elevation above the plain, the shore-line of an ancient sea, — a white stain defining its former margin as clearly as if the water had but just receded. On the dim, distant



The ancient beach line near Torres

base of the Sierras the same primeval beach could be seen. This water-mark, the level, white valley and the utter absence upon its surface of any vegetation, gave a strange and weird aspect to the country as if a vast tide had just ebbed and the brilliant, scorching sun had hurriedly dried up its last traces of moisture."

Another remarkable desert view may be had from the summit of Pilot Knob. To the left and flowing almost due west the Colorado River leads the eye along to the sand-hills which begin a little to the south and then sweep far away to the north. To the west of the sand-hills lies the floor of the desert, including the fertile

region of the Imperial Valley; to the south lies the great alluvial deposit brought down by the Colorado during past centuries with, in the far distance, the portion of it subject to inundation, where dense jungles and forests of deepest green relieve the eye. Beyond to the far west are the Cocopah and San Jacinto ranges fading away in their bath of shimmering haze and suggesting that here, at last, the end has come, for beyond them is the home of the setting sun.

An equally vivid picture by another writer, J. Ross Browne, from the opposite, or southwestern, angle of the desert, and looking across almost due east, is well worth quoting:

"I scarcely remember to have seen a wilder country than the first eight miles beyond Carrizo. Barren hills of gravel and sandstone flung up at random out of the earth, strange jagged mountain peaks in the distance; yellow banks serrated by floods; seashells glittering in the wavy sand fields that lie between; these overhung by a rich glowing atmosphere, with glimpses of Indian smokes far off in the horizon, inspired us with a vague feeling of the wonders and characteristic features of the desert region through which we were about to pass. I could not but think of the brave old Spaniards and their heroic explorations across the Colorado. Here was a glowing and mystic land of sunshine and burning sands where human enterprise had in centuries past battled with hunger and thirst and savage races, where the silence of utter desolation now reigned supreme. There was a peculiar charm to me in the rich atmospheric tints that hung over the strange land and the boundless wastes that lay outspread before us; and I drank in with an almost childish delight the delicate and exquisite odors that filled the air, and thought of my early wanderings, years long past, amid the deserts and palms of Araby the Blest.

"As we advanced into the desert each shifting scene developed its peculiar beauties. The face of the country for the most part is well covered with mesquite trees, sage-bushes, greasewood, weeds and cactus. Mountains are in sight all the way across and the old stage-houses of the Overland Mail Company still stand by the watering places. Many indications of the dreadful sufferings of emigrant parties and drovers still mark the road; the wrecks of wagons half covered in the drifting sands, skeletons

of horses and mules and the skulls and bones of many a herd of cattle that perished by thirst on the way or fell victims to the terrible sand-storms that sweep the desert. Only in a few instances, when we struck out upon the arid sand belts that lie between the alluvial beds of earth, did we encounter anything resembling the deserts of Arabia, and then only for ten or twelve miles at a time.

"The climate in winter is indescribably delightful; in summer the heat is excessive and travelers and animals suffer much on the journey. It was a perfect luxury to breathe such pure, soft air as we enjoyed in the middle of December when our Atlantic friends were freezing amid the ice and snow-banks of that wretched part of the world.

"The entire distance from Carrizo across the desert to Fort Yuma is one hundred and sixteen miles. Four stations where water can be had intervene on the road,— Indian Wells, Alamo Mocho, Gardners and Cookes Wells. At all those points the water is tolerably good and there are other points where brackish water can be had by digging a few feet.

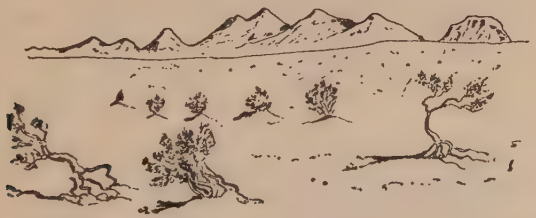
"About fifteen miles beyond Cookes Wells after coursing along the belt of the great sand desert on the left, we struck into the Colorado bottom. Indications of our approach to water were everywhere perceptible. Thickets of arrow-weed lined the way and forests of cottonwood loomed up ahead over which geese and cranes uttered their wild notes. Soon we passed some deserted rancherias and in a little while more our eyes were rejoiced with a refreshing view of the great Colorado of the West as it swept like a mighty serpent over the desert."

On the western slopes, and also on the northeastern edge of the desert, where the mountains are high and tree-clad, the ravines and canyons, in their higher reaches, are enlivened with small streams and occasional waterfalls. But as they approach the desert they flow more quietly, then sluggishly, as if fearful of the fate that surely awaits them. For, as soon as the devouring sands are reached, they are swallowed up, never to appear again, except perhaps in the alkali and brackish springs farther down which mock and tantalize thirsty men and animals. The Whitewater, in winter, often flows with enough volume and force to wash away roads and barriers erected to direct its course, and empties into

the Salton Sea. The overflow from the artesian wells at Mecca also unites to form a small stream which adds its tiny volume to the desert sea.

To the west of Indio and the oasis of the Coachella Valley there is natural verdure enough to attract attention, and this I have termed "Mesquite Land," for this interesting desert tree abounds there.

From the San Gorgonio Pass downward, and everywhere on the desert where the winds blow, the plants and shrubs present themselves in a new aspect to the stranger who sees the desert for the first time. On the windward side the sand is seen to be piled up in a peculiar conical ridge, the base of the cone being at the root of the plant or shrub. As the wind blows steadily and fiercely down the pass it carries away the sand except where



The fierce winds tear the sand away from the roots

the particles pile up around the farther side of the roots. This, better than anything else, tells the story of strong winds rushing in to replace the heated air which ascends from the scorched face of the desert within. In many places the mesquite and other trees are completely buried in the sand, except where the tips of the branches protrude. The effect of this is most peculiar, and yet beautiful and interesting.

In some of the canyons, especially near Palm Springs, and east and north of Indio, and even on the open desert, are groves of palms, indigenous to this region. In the presence of these ancient desert monarchs it is easy to forget the activity of American life, and all association with the occidental world, and imagine oneself in the heart of the Sahara.

Two solitary and detached mountains in the south attract our

In the canyon of five hundred palms

attention. These are Signal Mountain, over the Mexican line, and Pilot Knob, both well-known landmarks to Indians and whites, while Castle Dome and Picacho or Chimney Peak — the latter a sharp peak near the Colorado River a few miles above Yuma — are equally well-known and striking landmarks, though not so large as the other two.

Near the southeastern shore of the Salton Sea are four volcanic buttes (now made into islands), all of which are covered with lava float or pumice-stone. Tons of this material might be gained from these buttes, one of which is said to be the eminence on which the fabled Pegleg Smith mine is located. The island butte nearest to the railway is now the Pelican Island of the Salton Sea, for thousands of pelicans have made it their nesting and breeding place since the rising of the Salton.

While there is a large amount of sand on the desert, it does not, as is so generally conceived, cover the ground with particles so that little else is to be seen. There are scores of miles where there is no sand. In several regions it is piled up by the wind into hills of considerable extent and magnitude. The principal sand masses are found in the San Gorgonio Pass, east of the railway track below Palm Springs, west and north of Indio, in various parts of the old beach line east of Salton, Frink, and Volcano, along the line of the railway from about thirteen miles east of Imperial Junction to Pilot Knob, and on the line of the old emigrant road from Yuma to San Diego between Salt Creek and Carrizo Creek. This last-named mass is so important that of late years it has been known as Superstition Mountain. While it appears to be composed entirely of sand, there is a rocky mass below, and over this the sand plays, constantly shifting to and fro in the desert winds, and because of this instability the Indians of the region speak ill of it, hence its name. The great mass which makes a divide between the Salton Basin and the valley of the Colorado north of Yuma is the most extensive of all the sand deposits of the desert. This is the true Sahara of sand. On coming east from Yuma the traveler sees at Pilot Knob a line of sand-hills to the left, which continues for upward of thirty miles. At the station of Ruthven the smaller hills are close at hand, while a mile or so away are the larger hills. They are of every

shape and form. The winds from the north pile them up here and constantly shift their positions, sometimes covering the tracks, now and again burying a sign-board or a switch and requiring constant watchfulness on the part of the railway officials. Between the mile-posts 679 and 680 the sand again approaches the track and then dies away, the sand ridge sloping down toward the Salton Basin.

All these hills are "remarkable for their wave-like outlines and the purity of the sand. It is free from fine, earthy dust, and being perfectly dry moves about before the wind like the dry sand that has been washed on an ocean beach. The color varies somewhat in different localities, but is generally a light buff or reddish yellow, similar to ordinary river sand. A large proportion of the grains are translucent, and some are transparent." A

Sand-hills at Rimlon

most interesting fact is that when seen through a microscope many of these sand grains are complete spheres. The attrition caused by their constant motion has worn off all corners and roughness and left them perfectly rounded. Where the grains are of quartz, agate, garnet, or chrysolite they are most beautiful.

When, in traveling over the desert, one finds himself in the heart of these sand-hills, he finds them to be a series of mounds or hillocks of varying size and extent. Some are forty, fifty, sixty feet high, others much less. Therefore as one rides around their bases, or over some of the smaller ones, he finds himself shut in. Then, indeed, he can imagine himself in the precincts of a real sandy desert. A low, rustling sound is heard, produced by the moving sand grains. As a rule the sand does not rise high in the air, but bounds along on the surface, or only a few inches above it, so that the drift is enveloped in a sheet or atmosphere of

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IN THE SAND-DUNES ON THE COLORADO DESERT

moving grains. They generally rise to the slope, and when they reach the highest point fall down the steep bank to leeward. Several times on sleeping out among these hills I have had good opportunity to watch these phenomena. Lying down long before sunset I could see the constant movement of the grains, as if a slight moving mist of peculiar quality hung over the sand-hills, and, as I always stretched out my blankets on the lee side of the hill, I found a fair accumulation of sand deposited by the wind around and *in* my blankets before morning.

These dunes, from the security of a Pullman car or even from the safety of a wagon on a near-by road, seem very harmless objects, but let one unused to the desert beware how he risks his life in their dread wilderness. Once well in the heart of them one becomes utterly confused, for the wind completely destroys all tracks in a few minutes and it is impossible to retrace one's steps. While dissimilar when seen from a place of safety they appear all alike when one is in them. The heat is stifling, for the sands reflect the glare and heat, and one is almost blinded, and though there is wind it seldom reaches the secret recesses and little shut-in valleys of the dunes. It floats the sand over and upon you, and this heated sand irritates nostrils and mouth until one opens his mouth and pants like a dog, only to get more air so sand-laden that he cannot bear it. Many a poor wretch has been lost to the world forever in the treacherous secrecy of these sand-hills. Unthinkingly he has gone to his death,— been overpowered by the heat and thirst, and unable to find his way out, has fallen, to be covered almost immediately by the drifting sand and thus suffocated while unconscious.

The only safe plan I know of when thus caught is to take off one's coat and throw it over the head. Resolutely refuse to breathe through the mouth and by constant clearing of the nostrils compel inhalation by that channel. Sit down and make no attempt to escape during the heat of the day. If the sand begins to cover you, rise, and as it falls under you make it your new couch, and keep doing this so long as it is necessary. Then, when night falls, guide yourself back to safety by the stars. And one who cannot travel by the stars, and does not know the general direction of places in the desert, ought never to travel alone on it. He

does it constantly at the peril of his life, as half a thousand, at least, I doubt not, in the past fifty years have found out.

It is interesting here to note that in the sand-hills north and west of Indio, Mr. Fred Johnson is contemplating the planting of a sunken garden of date-palms similar to those found in the oases of the African Sahara. Part of his land reaches into these hills, and as he has an abundance of water he purposes to see if these apparently useless masses cannot be utilized for a good and profitable purpose.

Save for the Salton Sea, the Colorado, Alamo, and New Rivers, the flowing artesian wells in the Coachella Valley, and the streams like the Whitewater, Carrizo, and Salt, which run only in the rainy season or when the snows melt, there is no water to be seen on the desert. Here and there are the old Indian wells, dug deep in the ground, with one side sloped down to the very edge of the water to allow of easy access for man and beast, and all along the line are the railway water-tanks. Here and there are tiny springs, the water of which is carefully conserved, and along the roads to the north and east over the mountains and in the canyons occasional seepages, water-tanks in the rocks and bored wells are to be found. But in general appearance it is a waterless expanse, and one does not know how much he loves the sight of flowing water, whether in large or small bodies, until he finds himself upon the desert.

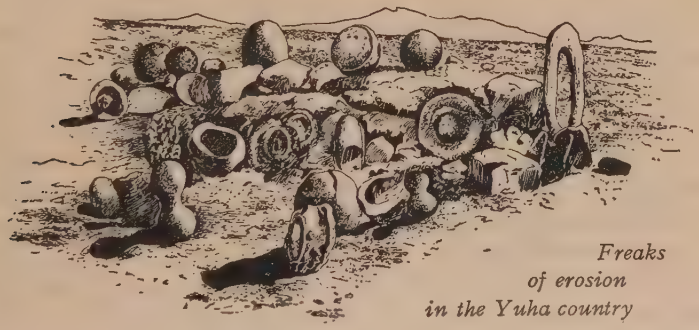
Prickly pear

In two or three places on the desert, but especially at the southern end, there are several large areas covered with small pebbles of various hard rocks, principally of volcanic origin, including different-colored porphyries, agates, and carnelians. These are beautifully rounded and polished, showing they have been subjected not only to transportation for long distances, which has caused marked attrition, but also to the smoothing influences of wind-driven sand. The wind has carried away all the sand particles from the interstices and the pebbles are left, packed together so closely and evenly, owing to their uniformity in size, that they seem as if pressed into a yielding surface by a heavy roller. This surface of pebbles is found to cover a mass of sand which lies below. Its protective value is obvious. Without it the sand

would be blown to and fro by the winds and thus add to the discomfort of residents and travelers.

It should be noted in this connection that the polishing of these pebbles is not accomplished by a steady wind blast in one direction, as that of the San Gorgonio Pass, but by the action of a finer-grained sand and dust, blown to and fro by the varying winds.

On the Yuma and San Diego road after leaving Cameron Lake lies the Yuha Plain, the most desolate, forbidding, barren, and terrible part of the whole desert. It is largely volcanic, several cone-shaped peaks rising from the blackened plain beneath. It is below sea-level and the rocks of the plain and the



Freaks of erosion in the Yuha country

bases of the near-by western mountains are washed and eroded in a wonderful manner. A recent writer thus describes them: "Mingling with the burnt stones and volcanic debris are rocks worn by the waves and shaped into hundreds of fantastic forms. There are many acres of these stone curiosities, and certain sections of the fields seem devoted to certain shapes and figures.

"For instance, one passes through a region which he at once names the cabbage patch, for it presents the appearance of a field of those vegetables which have turned to stone. The waves have worn the rocks into round boulders about the size of the vegetable which they so much resemble, and have cut into the globes, laminating them in perfect imitation of the leafy layers of the garden vegetable.

"Another locality is devoted almost exclusively to dinner-plates. Thousands of rounded, thin disks are scattered over the plain or are piled scores deep in singular piles, each piece shaped exactly like the crockery which adorns our tables, and quite as thin and symmetrical.

"Another section of this truly wonderful region is given almost wholly to dumb-bells. These vary in size from pieces weighing one or two pounds up to those seemingly calculated for exercising the muscles of a giant, and weighing thirty or forty pounds each. In almost every instance these natural dumb-bells are well balanced, the balls at either end of the connecting piece being of the same size and weight.

"There is, in this plain, an arsenal, also. While guns and swords and bayonets and powder were not there to be found, there are thousands of cannon-balls varying in size from two- and three-inch balls to those fit for the big thirteen-inch guns of modern warfare. And all are of stone. All formed in Nature's workshop.

"There are other objects innumerable. There are stone roses, stone lilies, stone tulips, stone leaves, stone birds, stone animals, stone quoits, stone ornaments in varied and unique designs, stone canes — in fact, an immense variety of things imitated in stone on the plain of Yuha.

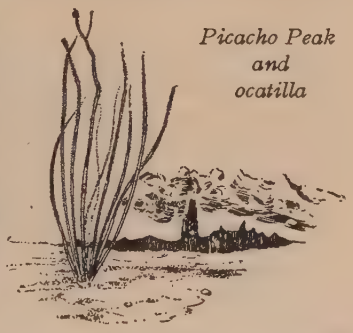
"In the direction of Carrizo Creek, in one portion of Yuha, rise two hills, or small mountains. One might mistake them, in the distance, for ancient craters, but when he approaches the eminences he discovers them to be monuments to an ancient life — the records of species now extinct. They are shell mountains; great beds of prehistoric bivalves which were left stranded when that ancient sea swept back from the region and left a dry and desolate land.

"One of these mountains, the larger one, is composed wholly of large rough shells, much larger but less elongated than the shells of the modern oyster, which, in some respects, they so much resemble as to lead to the suspicion that they are the remains of the ancestors of our much-prized bivalve.

"The lesser hill is composed of tiny shells of a prehistoric type of brachiopoda. Like the larger shells, they are found, except on the surface, in an undisturbed state, both valves of nearly every shell being found in position. Although the mollusk dwellers of

these shells vanished several centuries ago, so perfect are the shells one almost expects, when he opens the valves of the shell, to find the living creature within."

Until the Salton Sea covered them in May, 1906, one of the most interesting and peculiar features of the desert was the so-called "Mud Volcanoes." There is another group of these below the Mexican line in the vicinity of Volcano Lake. While the upper group were first noticed after the earthquake of 1852, they are undoubtedly of much prior existence. They were boiling springs of quicksand and mud that had thrown up their own cones to a height varying from a few inches to fifteen or more feet. They are now drowned out by the Salton a few miles southwest of the station of Volcano.



Picacho Peak and ocatilla

On the southwest side of the point below Fig Tree John's, about twelve or fifteen miles toward the mountains, is an area over half a mile square, covered with the cones of a mud volcanic region similar to the one I have just described. But these are all dead. The cessation of activity left the cones to the forces of erosion. Wind, storm, rain, and sand are playing havoc with them, and they are now rapidly succumbing and weathering away. In exploring the region, however, one must be exceedingly careful to avoid serious injury, or, perhaps, death, for the chemical and aqueous agencies long ago at work here have tunneled strangely into the crust of the earth. Great chambers, long galleries, far-reaching corridors, tall chimneys, sloping chutes, and yawning abysses lie in wait, merely covered by the calcareous and other deposits of the volcanoes. In treading one is liable to step on one of these covered pitfalls and drop to disaster or death below. Being out of the line of any travel and in a region not at all alluring or suggestive even to a prospector, this "devil's half-mile" is practically unknown, save to a small handful of the adventurous spirits that love to penetrate even into mysteries that seem to be profitless.

All through the summer and occasionally during the winter dust

whirlwinds may be seen in different parts of the desert. These spiral shafts of whirling sand rise to the height of one, two, even three thousand feet, and while to be in their course is to be covered with dust and to have one's hat and clothing and hair tousled and roughly handled, to stand apart and witness them, like shining shafts of marble, glistening in the sun, moving along with stately majesty, is to witness that which is as inspiring as it is novel.

Distances on the desert seem much shorter than they really are. In the early days the government surveyors, familiar with distances, estimated the distance of the termination of the San Bernardino range from the Colorado River at four miles. They found it to be thirteen. Every party of prospectors has a similar experience. Its members start out to reach a given spot. In the cool morning air they are exhilarated and confident. They ride or drive or walk and the object gets no nearer. The hot sun comes out and scorches all exuberance out of them and they plod on in weary desperation, and yet they seem to be little, if any, nearer. Their water gives out and they suffer agony, but still drag one foot after another, and yet their destination is far away, and, unless some one has had intuitive foresight or unusual precautions have been taken, another party returns to civilization with one or more of its members left dead on the desert.

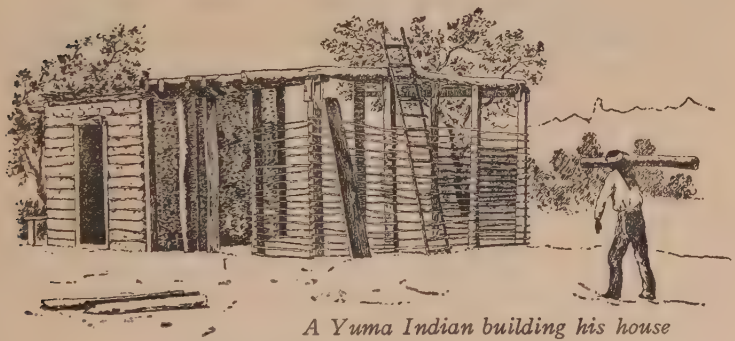
The clarity of the atmosphere has much to do with this deception, for it enables one to see as if through field-glasses, but the chief reason is found in the lack of moisture in the atmosphere. Moisture sets out the various parts of a mountain range in true perspective; each ridge has a moist atmosphere, so to speak, to float in and make it stand out from every other ridge. This enables the eye to judge of comparative distances. But on the desert one ridge is superposed upon another, one range upon another, and the eye is unable to segregate them. Not until one is close upon them are the separations noticeable. Then, too, the clarity of the atmosphere, combined with the rarity of objects of comparison, aids in the deception. The very barrenness of the desert aids in making distances illusive. Were its vast spaces filled up with towns and cities, forests and rivers, even though its atmospheric conditions could be preserved (which, of course, they could not), the illusions of distance would be materially decreased.

As to the heat of the desert, the temperature has a wide range. In winter the climate is delicious beyond compare, but in summer it is hot, 120° Fahrenheit being not uncommon.

Hot? Yes. So hot that in the fertile part of the desert many of the workmen, plowing, harrowing, sowing, reaping, or what not, go two or three times a day and incontinently tumble themselves, clothes and all, into the irrigation reservoirs, then walk out and coolly go on with their work.

Hot? Yes. So hot that I know men who turn the hose upon their bed and sprinkle it down about five or six o'clock in the evening in order to cool it off before they retire.

In the summer months it behooves every stranger upon the



A Yuma Indian building his house

desert to beware how he tempts Providence. Many a man, who had even become somewhat acclimated, has lost his life by being too bold, too confident.

There are several regions that may be termed the oases of the desert, such as Palm Springs, the Coachella Valley — which includes Indio on the north and Mecca on the south — and the Imperial Valley. These are all caused by irrigation and are beauty spots, indeed, when compared with the barrenness of the surrounding country. Their origin and growth and the marvelous results that experience has demonstrated are to be looked for by further efforts are worthy of the more extended observation that will be accorded in other chapters.

Between Parker, Arizona, and Picacho, California, lies the great

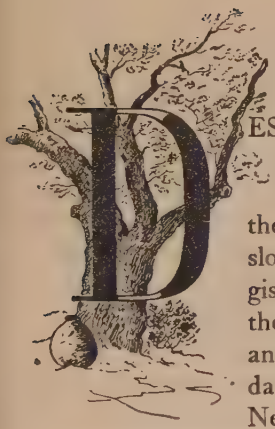
valley of the Colorado River. This is an alluvial valley one hundred miles long and about eight miles wide. It contains not less than five hundred thousand acres of good and fertile land needing only irrigation to make it as productive as any in the country.

There are comparatively few Indians in the desert region. The group of villages of Coahuillas in "Mesquite Land" and the contiguous mountains, the Chemehuevis and Yumas on the Colorado River, and a few nomad Cocopahs now and again located near to Calexico, with their primitive dwellings, are the only representatives.

These, in the main, are the physical features that characterize the Colorado Desert. Though, in the following pages, I have confined my descriptions to the region north of the Mexican line, it must not be forgotten that no arbitrary political boundary sets off the Colorado Desert. The same conditions exist to a greater or lesser extent below the line as above.

CHAPTER II

The Physical History of the Desert



DESERTS are made, not born. Like Topsy they "grow." The sands and beaches and mineral deposits and mountains of a desert like the Colorado are an accretion, a more or less slow growth, not a sudden birth. The geologists have discussed the problems involved in the birth of the mountain ranges of the desert, and seem to be agreed that they are of a later date than either the Coast Range or the Sierra Nevadas.

Beyond the San Bernardino ranges to the north and east are numberless smaller ranges, most of which are volcanic. These and the consequent valleys between fill up the space between the sands of the Colorado Desert and those of the Mohave. These volcanic ranges are scattered in careless confusion over the whole area. There is no parallelism, no uniformity of direction or size. They are alike in their rugged barrenness, their inhospitable character, their almost freedom from verdure, and the scarcity of water. Almost the whole region east and west of the Colorado River for six hundred miles of its course above the gulf may be said to have the same singular characteristics. The plains and valleys between the mountains are low, hot, arid, and scantily clad. The exceptions from these generalizations, both in place and time, are fully noted elsewhere. During the summer months the sun pours down its fierce heat upon the sands and rocks untempered by clouds above or forest shades beneath. Rains fall seldom, and when they do come they generally fall with such suddenness and large volume that they sweep over the country with uncontrolled force, dashing down the bare mountains in unrestrained torrents and over the plains in floods which carry

everything before them. Disappearing almost as rapidly as they come, they leave no nourishing moisture behind; indeed their sudden onslaught seems to do more harm than good, for they wash away a large part of the humus that, with pathetic patience, the sand and rocks seek to accumulate from the few desert plants and shrubs that desperately cling to the inhospitable region, refusing to be ejected.

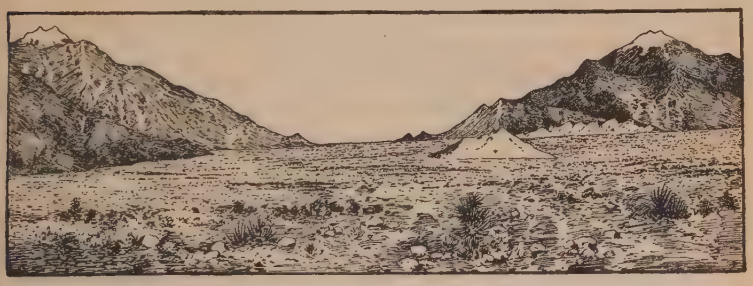
Originally here were but few springs, and though I have written a chapter on the rivers of the desert only the Colorado is reliable in its constant flow. The others are intermittent, now flooding the regions through which they pass, washing out roads, carrying away bridges and railway tracks, destroying irrigating aqueducts and ditches and ruining growing crops, and then ceasing entirely, so that a stranger passing over their course is apt to deny their very existence. Capricious, uncertain, wilful, and destructive, they are not like the beneficent rivers of the East that flow placidly along through fertile meadows, friendly to man and beast and yielding themselves to the general aspects of civilized countries. Like the wild animals that lave in their waters and the sterile country through which they pass, they must be tamed and made subject to the will of man ere they will yield anything of beauty to the landscape, nourishment to the soil, or comfort to mankind. The few springs have been fostered and cherished by dusky aborigine and white settler alike, though their waters are for the most part either saline or alkaline. Few, if any, of the older known springs, save in the higher reaches of the mountains, but contain minerals in solution in distinct quantities, so that both man and beast, used to the purer water of more hospitable regions, seek in vain to quench their thirst. Only habitude renders the waters palatable and acceptable. The story of how many of the wells came to be dug is told in the chapter on the pathfinders, and when one stands by the side of these pathetic scenes of man's struggle to wrest this necessary element from the hostile desert he feels to the full the measure of will power, of indomitable energy, of dauntless courage, of persistent effort his fellows are capable of making in order to carry out their inflexible will. Recently artesian wells have been bored in the upper portion of the desert, from Indio to Mecca, and this one factor has changed

Photo. by H. C. Tibbitts, San Francisco, Cal.

COLORADO DESERT FROM ANDREAS CANYON, CALIFORNIA

the region from barren and waste sand to fertile and rich farms, where melons, cantaloupes, figs, oranges, grapes, and small fruits grow to perfection and are ready for market many weeks ahead of those grown on the seacoast side of the mountain ranges.

There are three principal soil levels. The first is best seen when descending into the desert over the San Gorgonio Pass. It is formed of great masses of rock, gravel, and detritus, washed by cloudbursts down the canyons and sides of the steep mountains and swept far out over the sands. Standing at Palm Springs station and looking to the northwest a great "fan" of this rocky detritus is seen, many scores of feet high and extending for two or more miles into the heart of the desert. The second level is of sand, representing the former beaches and bed of the ancient



The San Gorgonio Pass

sea, while the third is composed of layers of clay, fine sand, and silt, laid down in the still water of a fresh-water lake. The evidences of this fresh-water lake are as abundant in its beaches and shells as are the evidences of the occupancy of the region by the gulf. All along the foot-hills, seen to the right after the train leaves Palm Springs station, and approaching Indio, are discolorations in an even, horizontal line and extending for a long distance. These are calcareous incrustations which cover the surface of the rocks and enter into every cavity and crevice. At Indio the people speak of them as "the coral reef" and take their friends and visitors to see them as a great curiosity. This crust was undoubtedly deposited under water, and on examination is found to be cellular and full of small spiral shells. These shells

also are found in vast quantities on the clay and are scattered all over the region from Indio to the Salton Sea and below. In some places they actually whiten the ground and can be shoveled up by the millions. They are all fresh-water shells of the *Planorbis*, *Anodonta* (*A. Californiensis Lea*), now found in the Colorado River, *Physa* (*P. humorosa*), and *Amnicola* (*A. protea* and *A. longinqua*). The Physa is still found in some of the springs on the New River.

While the surrounding mountains have contributed their quota to the sands, gravels, and clays that constitute the floor of the desert, they have yielded but an infinitesimal part of the vast quantities that have here found lodgment and home. The history of these sands and their removal to this region is one of the most fascinating chapters of dynamic geology and one which more fully, perhaps, than any other manifestation of natural power sets off its majesty as compared with the pygmy endeavors of man. The full history can be read only by years of study in the mountains where the Colorado River has its birth and in the plateau regions through which it and its tributaries flow, but a good substitute for these years of personal investigation and study may be found in Major Powell's great book on the "Canyons of the Colorado." Here he traces, step by step, the growth of the mountains, their steady uplift out of the primeval oceans, the birth of the river, the slow cutting down of its mountain channel to correspond with the land's uplift, and the denudation and degradation of the rocky strata of the country for many hundreds of miles. All the rocks and sand and débris of these strata found their way into the Colorado river-bed, there to be tumbled and tossed, rolled and crushed, battered and pounded out of all resemblance to their original rocky form and carried either bodily, by the force of the stream, or in solution, to be voided violently at its mouth or deposited gently as the flow of the river grew more sluggish.

See, then, this native bowl of the Colorado Desert. Comparatively little of rocky débris had flowed into it from its own immediate mountains. The waters of the Gulf of California reached up as far as the slopes of Mounts San Jacinto and San Bernardino, taking in all the region now known as the Imperial

Valley, the Salton Basin, and the Coachella Valley. It stretched away to the south as far west as the Cocopah Mountains, which are an eastern offshoot of the Sierra San Jacinto. Beyond the Cocopahs, also, the gulf extended, over what is now called the Maquata Basin, to the slopes of the main range and up in the direction of San Diego. The whole of the present delta of the river was included, so that there was an area of over three thousand square miles which, in those prehistoric days, was included in the Gulf of California and covered by its waters. And this area does not include the Mohave Desert. How came about the change, and whence all this vast volume of sand to fill up so large an area? As I have elsewhere shown, the Colorado River is the answer. It was the excavator, the steam shovel, the power dredger, the carrier, the depositor of it all. Unaided it has accomplished what all the men of all time with all the machines ever invented could not have done.

From many evidences it is assumed that the river, at this time, emptied into the gulf not far from Pilot Knob, pouring out its waters in a southwesterly direction against the Cocopah peninsula. Day after day, week after week, month after month, year after year, the surcharged river voided its load into the open gulf. It is more than probable that the coarser and heavier materials were deposited near the mouth of the stream, thus forming a perpetually growing encroachment upon the waters of the gulf. Little by little the bowl was filled up, until at last the material brought down by the river began to show above the face of the water at low tide. This deposited material then asserted its will over that of the river. It said in effect, "You shall not deposit all you bring right here. You must carry it farther down," and in sullen anger the river slowly and sluggishly obeyed.

But when the snows of the winter were melted by the summer's sun in the high mountainous regions and "a million cascade brooks united to form a thousand torrent creeks; a thousand torrent creeks united to form half a hundred rivers beset with cataracts; and half a hundred rivers united to form the Colorado," and all these brought their large quota of mud, sand, pebbles, and rocky débris and poured them into this one great river, it occasionally rose in its mad, wild fury and shot its unwelcome load wherever

it would. At such times it broke all the bounds it had made for itself by previous depositions in the gulf.

During one of these floods it voided so vast an amount of sediment that the area directly in front of its mouth was covered to a height much above that which the water itself attained when the flow was normal. As a result, when the flood subsided, a great dam was found to have been built which shut off the northern portion of the gulf, that which included the Imperial, Salton, and Coachella Valleys. "Under these conditions," says Professor Blake, "the channel connecting the upper and lower portions of the gulf must have gradually become more and more shallow, and the continued growth of the delta must have filled it up, so that the tide could no longer ebb and flow to the upper end, thus forming a lake, its only barrier on the south being the silt and mud of the Colorado. This barrier was probably an extended flat, and not a narrow bar, for the silt was undoubtedly much spread about by the tides and the current caused by influx of the river. A very considerable portion of the silt was doubtless carried to the extreme northern part of the gulf, forming the foundation for the superstratum of clay of lacustrine origin which we now find there. The accumulation, however, was undoubtedly most rapid and deep opposite the mouth of the river, and it must have formed an effectual barrier between one part of the gulf and the other. It must have been covered by only a few feet of water, and was thus left entirely bare at low tides. Such conditions were most favorable for the rapid growth and transformation of the flats to dry land or salt marsh. Every great freshet in the stream must have made great additions to it, until at length it was submerged only when the tides were very high and the river much swollen. In that climate, a surface of mud exposed to the sun and air, and so well watered, must have been covered with a luxuriant growth of tule, grass, and other vegetation; and it doubtless existed for a long time as a low swamp, traversed in every direction by sloughs and channels.

"It is probable that even after the delta had so far grown as to be above the water, there were numerous narrow canal-like channels between the river and the lake, or between the lake and the gulf; so that the water in the lake was constantly retained at

the same level. That the lake received its supply of water, in great part, from the river is shown by the fact that it was *fresh water*, or but slightly saline; the presence of salt or brackish water being proved by the fossil shell *Gnathodon Lecontei*. The great deposition of clay containing the shells probably took place in this way; the current of the river being at times, if not constantly, turned in that direction. In this case the excess of water, if not removed by evaporation, must have flowed out into the gulf by some channel farther south. It is not impossible that the Colorado once flowed along the line of banks or terraces near Cookes Well and the Alamo, and after depositing its silt in the quiet water of the lake, escaped to the gulf, at some point near or below the present entrances to New River. With the immense quantities of silt that the Colorado brings down, even now, such conditions could not long remain, and the river must have been turned toward the more open waters of the gulf by the resistance of its own depositions. After the lake had become deprived of its supply of water from the river, and its communication with the gulf became closed, except, perhaps, at seasons of freshets, it must have undergone rapid evaporation, especially in that region of violent arid winds, pouring in from the surrounding deserts and over the mountains from the sea. It is not difficult to comprehend that this cause was sufficient to remove all the water from the lake in the course of a few years.

"Some of the conditions which have been detailed as probable are still found to exist. The Colorado yet continues to overflow at seasons of high water, and the water runs backward for sixty miles, and forms a chain of small lakes or ponds; the water in these evaporates rapidly, and disappears soon after the supply ceases. We find an extensive area of low and marshy land around the head of the gulf, which is annually overflowed and covered by quantities of silt spread out upon it by the Colorado. Father Consag, who made the first survey of the gulf in 1746, ascending as far as the mouth of the Colorado, describes the land about it as low and marshy; the mud being red, and so soft that it would not support the men when they stepped out upon it. The enormous quantities of silt carried down by the river is shown not only by the dark-red color of its water, but by the discoloration that

it produces in the water of the gulf, which was formerly called the Vermilion Sea, probably from its red color."

I have thus presented in full Mr. Blake's theory of the formation of the Salton Basin. It was the first, and so far has been the only scientific presentation of the subject. I am inclined to think, however, that slight divergences from his theories may be noted, based upon my recent studies of the Alamo and New Rivers. These differences will be noted as the careful observer reads what follows.

Assuming the casting up of the natural dam and the isolation of the northern portion of the gulf, it will be seen that it was still full of salt water, — water brought in by the tides that rise and fall in the gulf. Being thus shut off from the gulf and receiving no material inflow from any other source, evaporation soon dried it up.

Some geologists in accounting for this shutting off of the desert from the Gulf of California assert that it was partially attributable to one of the slow uplifts of which we have so many evidences throughout the geological world. This seems to be more an assumption than a scientific deduction, for careful measurement of the old beach lines, which are found all along the walls of the desert, shows that they have the same elevation as the present-day sea-level. It would appear, therefore, that there has been no uplift of the region since the gulf occupied it, but rather that the river itself caused its isolation, and evaporation carried off the imprisoned waters. In the meantime the river built up a channel for itself higher than the surrounding country which it had made,— a channel which flowed to the east of the great dam it had formed and with a general trend southward. Floods still continued to be made by the melting snows of the mountains, and possibly each year the river overflowed its self-made channel into the low-lying country beyond. By this time — for it would take but a few short years to completely dry out all the salt water from the isolated basin — the desert bowl possessed somewhat the appearance it has for us to-day. The sea beach line was formed, and the great piles of sand were being dried out and carried to and fro by the winds as they are now.

Then came a flood which broke over channel and dam alike and formed the course of what we call the Alamo River. This was

the channel through which a portion of the waters of the Colorado was poured into the basin and made of it a fresh-water lake. Year after year it flowed, and maintained the fresh-water character of what had, in comparatively recent times, been an arm of the gulf, then a salt lake, then a dry basin. It was at this time that the fresh-water shells were deposited of which millions are now found, and the calcareous matter deposited which forms the "coral reef" west of Indio.

Possibly it was while the bed of the basin was dry that the aborigines first came and dwelt in it. If so, this would account for their tradition that long after they had occupied the region the floods came and drove them out. But I am inclined to the opinion

Salton Sea by moonlight

that this occurred not once, but many times. The new channel of the Alamo may have conducted the waters for many scores of years or even centuries into the fresh-water lake, — for, of course, its waters would now be fresh owing to its isolation from the gulf, — and during this period another overflow cut the channel we call the New River. For there is no reason to assume that the New River is a recent creation, any more than that the Alamo is. The same conditions that caused the Alamo may also have created the New, and the geological history of both confirms this theory. Both have been fresh-water channels to the Salton Basin from long before historic times.

Then came another flood epoch, which built a dam across the Alamo channel. This closed part of the fresh-water supply and

finally, when another flood closed the New River channel, the Salton Sea again dried up, this time leaving the evidences of its fresh-water history.

The evidences are clear that the Alamo channel had its entrance not far — a few miles to the north or the south — of the intake cut by Engineer Rockwood of the California Development Company, so that he was merely doing what Nature had done centuries before, and at the same time undoing some of Nature's later work. Thus we have the spectacle again presented to us of the Salton Basin filling up with the fresh water of the Colorado River. Unfortunately the conditions now are not so simple as when none but a few nomad Indians occupied the dried-out sea bed. Miles and miles of railway, a score or more of towns, and fully fifteen thousand inhabitants, with their homes, their orchards, their farms, their all, live in the bowl of what in turn has been gulf, salt sea, and fresh-water lake. Hence what man can do to arrest what would once have been regarded as the simple and natural course of nature he will do with energy, persistence, and success, and the Salton will erelong revert to its former condition as the Colorado is forced back into its old channel.

While there are many other dynamic problems connected with the desert, these will be found discussed elsewhere to prevent repetition, my chief aim, in this chapter, being to make clear the theories I hold as to the successive steps in the history of the peculiar and distinctive below-sea-level feature of the Colorado Desert.

CHAPTER III

Desert Surprises

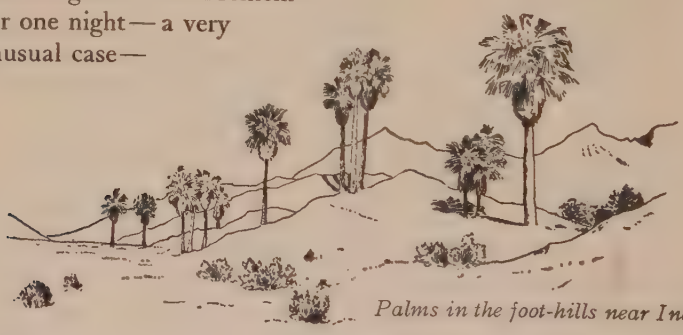
THE horrors, terrors, discomforts, and harsh conditions of the desert have so largely been dwelt upon by writers and others that there are few people who are not filled with misconceptions as to what the desert really is. To such the desert — *as it is* — is a place of perpetual surprises. One morning I found myself recounting these surprises. The long list of them amazed me. This chapter is the result. It is merely a condensation of what will be found treated more fully elsewhere in these pages.

One of the first great surprises is the clarity of the atmosphere. Even to those well acquainted with the clearness of Southern California — the peopled portions usually known by that name — the especial transparency of the desert atmosphere comes as a delight and a surprise. Everything stands out with startling vividness. Every line of the mountains is as sharply defined as if newly cut; each dent and dimple, canyon and peak, is clear and clean cut. In the early morning when there are no heat waves, no haze, no flying sand, there seems to be no limit to one's vision. Size, of course, suffers, but everything, no matter how far distant, is clearly to be seen.

The large, bright beauty of the stars is a surprise. Only on the desert are such stars and such evening skies ever seen. In a vault of pure, deep, turquoise blue each star stands out with a vivid luminosity that is startling. They seem larger as well as clearer. In the presence of such stars one can better understand the story of the wise men who came to see the infant Jesus, led by the star in the East. In such a desert atmosphere a large star would blaze with a power of attractiveness no intelligent mind could resist.

And, oh! the surprises of the night. Heat, fierce, blazing, scorching, intense all day! Then, as soon as the shadows fall, how soothing, how restful, how delicious everything becomes! The coolness, like a silent dream river, flows all over and around you, and then into you and you feel the restful influences as a real thing entering into your being. The calm quietude seems a foretaste of that future we think of, "where the wicked cease from troubling and the weary are at rest."

The heat of the desert is a matter of great surprise to most people. Temperatures, in the shade, of 110° Fahrenheit, 120°, and even 130° are not uncommon, and once in a while it reaches 140° and even higher. Out in the sun the thermometer must be much higher. I well remember one night — a very unusual case —



Palms in the foot-hills near Indio

where the thermometer registered 128° at midnight. To those familiar with the enervating and depressing heat of the moister atmospheres in the middle western and eastern states these figures seem incredible, and the wonder is not lessened when it is discovered that white men as well as Indians work all through the summer in these temperatures, without fear of sunstroke, which is practically unknown, and are both healthy and happy. Yet the heat is intense. Let this be not misunderstood. I do not wish to minify the frightful and scorching heat of the desert, and its effect upon those who are unused to it. At first it seems as if it would paralyze one, as if he must dry up and blow away. This, of course, is in the hottest days of summer. These are the days when it is suicide for the stranger to attempt to go out alone on the desert, and yet, strange to say, many a new prospector

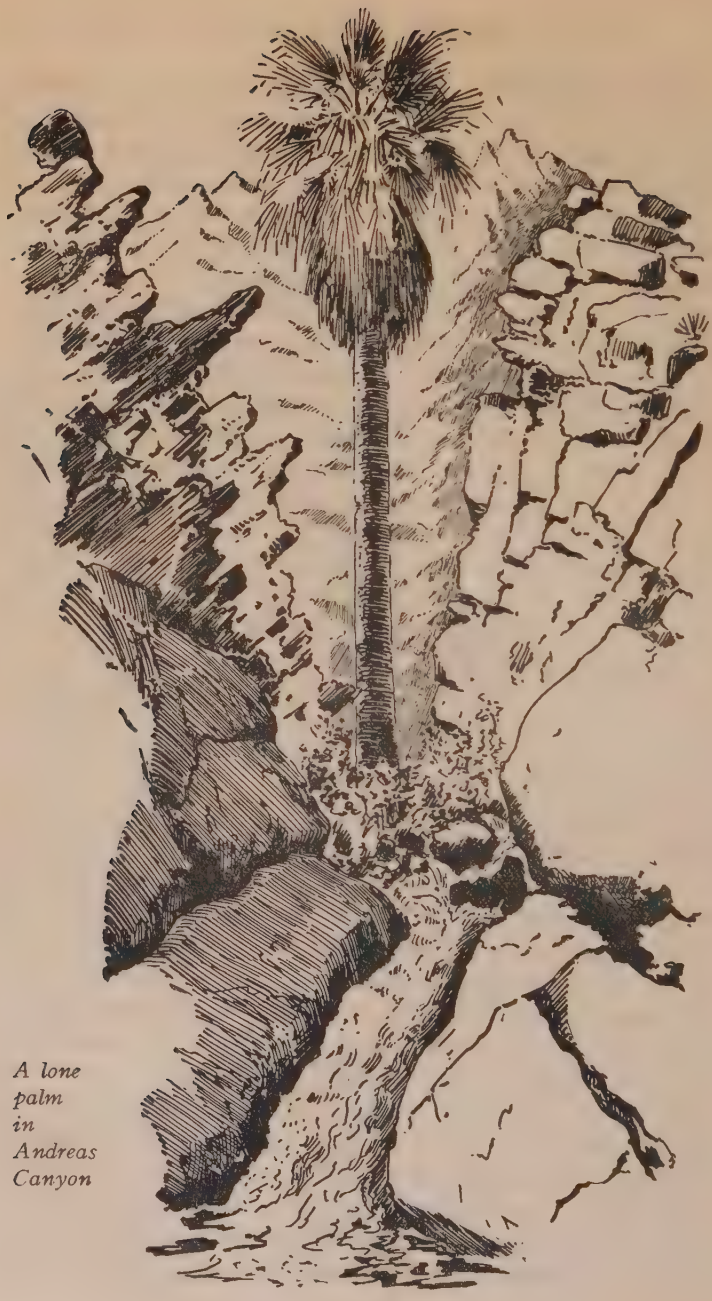
will make his initial trip at such a time, thus giving rise to another of the desert surprises. For is it not surprising to a remarkable degree that an intelligent human being will start out on such a dangerous trip without due regard to his safety and without consultation with those who are able to advise him? Many a bleached skeleton is all that is left to tell of the foolhardiness of those who have dared the fierce desert heat in this manner.

Yet there is a very definite reason for this self-evident foolhardiness. It is another of the surprises of the desert. The clarity of the atmosphere makes distances deceptive. This is now so well known that few are not aware that the fact is as stated, and yet, such is the reliance one places upon his judgment or on the unsupported evidence of his own senses, that he will not accept the warnings of those who know, but walks directly and seemingly with wilfulness into the greatest danger.

This, however, is only a small part of the explanation. During the cool of the early morning, while the air is like champagne or some electric fluid coursing through his veins and giving to nerves and muscles unwonted sensations of stimulus and exaltation, it requires a more than usually steady brain to keep one from forgetting the limits of his strength and the change a few hours will bring. Heat? What heat can hurt him feeling as he now does? Water? He can walk thirty miles as easily as five in this atmosphere. And he starts out under the influence of this delicious desert intoxication — I have done it myself many a time — only to find suffering awaiting him later, and, if he be very ignorant of desert conditions, possibly death. Even old prospectors are occasionally bewitched into carelessness by these seductive electric conditions, and the older and wiser the prospector the less willing is he to take any chances. For the midday and afternoon heat are blistering and burning beyond conception of the mind familiar only with ordinary conditions.

And yet, strange to say, in spite of this heat the wonderful range of temperature found on the desert and its environs is one of its greatest surprises.

When you tell the stranger that the thermometer registers as low as 17° Fahrenheit, or fifteen degrees below freezing, a very much lower temperature than is found in the better known parts



A lone palm in Andreas Canyon

of Southern California, he finds it a difficult statement to believe. If, in addition to this, you include the temperature of the mountains of the desert in the range, the figures are more startling still, as it is asserted (no observations having been made) that on the summits of San Gorgonio and San Jacinto a temperature far below zero is to be found.

Here then, given a zero temperature, we have a range from zero to 160° Fahrenheit, surely a wide enough variation to satisfy the most exacting.

But it is not only in the wide ranged temperature recorded at different times and places on the desert that surprises lurk. One is sometimes met with a climatic change in a short walk or drive that is startling in its suddenness. Some atmospheric phenomenon causes an immediate radiation of heat, or influx of cold air, that is almost paralyzing. Once in riding out from Palm Valley to Palm Springs station I left in a most comfortable temperature. It must be remembered that the valley is completely sheltered from the north and west by the gigantic walls of Mount San Jacinto. The moment we emerged from the sheltering walls a fierce, cold, penetrating blast, rushing with great speed down through the San Gorgonio Pass, struck us and ere we reached the station we were almost stiff with the cold.

The reverse of this experience, where one goes from the cold or hot wind of the San Gorgonio Pass into the perfect shelter of the spur on the way to Palm Valley, seems little short of miraculous to those who have not been informed and who do not comprehend the simple explanation of the phenomenon.

Rain on the desert is always a surprise. Strangers gaze in wonder at the simple event and ask in amazement, "Rain? Why, I thought it never rained on the desert." The desert dweller, who during a hot and rainless spring, summer, and fall almost forgets how it looks and feels to have the beneficent showers fall upon him and the dry and thirsty country around, and who feels thirsty at every pore, never gets over his surprise and delight when the first rains of winter come. But to see and feel it rain in the middle of a hot summer, who can describe that? Yet it sometimes occurs. To see the thirsty ground, the shrubs and trees drink it in, and to feel the delicious moisture penetrating

every pore of the skin and soothing every nerve and muscle and gently stealing even into the brain and easing up the dry, taut feeling there, while at the same time it fills the veins and makes the blood flow more fluidly,— that is surprise and delight that few have ever realized.

Rain generally falls from December to February, but there are showers sometimes in the heart of the summer.

And in this connection one cannot ignore the surprise he feels at the power of the Indians to foretell these unusual showers, or the abundance or scarcity of the regular rains. This past summer one of the Palm Springs Indians definitely assured us, "Heap plenty rain this winter. We catch 'em lots." And so it proved, for the winter of 1905–06 has seen a large rainfall.

It will be a surprise to many to learn that in variation of altitude the Colorado Desert is the most remarkable place now known on earth. The San Jacinto Mountain is its northwestern outpost with an elevation of 10,805 feet. The Salton Basin is 253 feet below sea-level. In a direct line the distance between the two is approximately twenty-five to thirty-five miles, so that in that short distance the desert gives us a variation of altitude of over eleven thousand feet.

But if one should object and say the mountain summit should not be regarded as belonging to the desert, we will take the town of Banning as the highest point or outpost of the actual desert. Its elevation is 2,317 feet, which, added to the Salton Sink depression, gives a variation of 2,570 feet in a distance of less than one hundred miles.

There is a peculiar charm and surprise about the odors of the desert that needs comment. Each odor is vivid and distinct, and can readily be distinguished from its fellow. It is as if the pure atmosphere compelled a segregation of odors rather than a commingling of them. I remember one night walking along in the warm air of the virgin desert with the vivid odor of the creosote bush filling the nostrils. Suddenly we entered a stratum of cooler air. The creosote disappeared and that of growing alfalfa took its place. Fifty yards farther on there came the smell of burning wood — indicative of man's dwelling — then the odor of willows. It was not the variety that surprised but

the clear vividness of each odor as set off from all others that arrested the attention.

And one may be on the desert a whole year and never have his senses assailed with the vile odors that are the peculiar property of cities. Decaying garbage, the musty smell of shut-in rooms, the awful air of closed-up churches, the polluted, "gassy," earth smells when the streets are dug into for repairs to gas-mains, etc., the thousand and one smells and stinks and abominations to the olfactory senses of civilization are never present on the desert. I am willing to endure the primitive conditions in order to be free from these apparently necessary adjuncts of our civilized life, for in the one are health and life and in the other are disease and death.

There is another phase, too, of the odors of the desert that must not be overlooked. Whatever the doctors or scientists say of them, there can be no question but that the odors distilled by the sun from the numberless sages and other desert plants have a distinctly soothing and healing influence upon all people suffering from pulmonary or bronchial difficulties. To be slowly suffocating through the cruel action of dread disease and then to come here and find relief, find the lungs beginning to expand again, the closed passages opening, the blood beginning to circulate again, this is to experience a delightful surprise. And it is one that never fails if the sufferer comes early enough and is willing to place himself wisely under these beneficent desert influences.

The colors of the desert are a never-ending source of delightful surprise. Here where I sit in the shade of a house, in March, 1906, at a little after five in the afternoon, the southeastern extension of the San Bernardino range and the Chocolate Mountains are before me. Such a mass of glowing color is never witnessed away from the desert. No artist could reproduce it. Its glow is too vivid and fiery. The hills themselves are apparently devoid of all verdure, and seem, from here, as if made of varicolored clays,—the predominant tints being reddish gray, a light sage-green, olive, and brick-red. At the extreme end of these hills, which are gradually diminished in height, is the Chocolate range, so named from its vivid color. As one looks at the lighter and

lower hills in front of the darker it is hard to believe that the difference is a real one of color. It seems as if it must be that the eastern range is in shadow, while the foot-hills are in brilliant sunshine. To the left stretching far away to the north and northwest the San Bernardino range grows darker and less brilliant, and the snow-cap of the giant San Gorgonio is hidden in the haze of the sky. Another day it will stand out as vividly and distinctly as if but a mile or two away, and every canyon in the seamed and rugged slopes will be as clearly discernible as are the foot-hills just before me this afternoon.

Yuma woman

And so it is every day. The mountains are a never-ending source of surprise in the delightful color changes they offer.

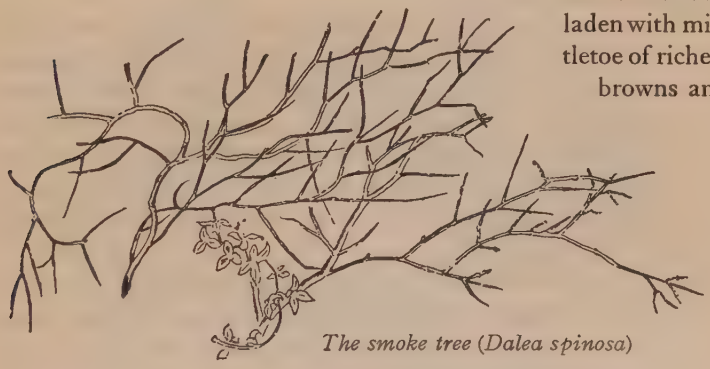
Then the sunrises and sunsets and the various colored sand, and the glistening efflorescence of the salt, the various greens of the trees, from the light pea-green of the cottonwood and willows to the olive-greens of the mesquite and the greenish Vandyke browns of the mistletoe,—these are to be seen nowhere else in the world as they are on the Colorado Desert.

Now, half an hour later, the hills have lost their glow,—they are in shadow. A far-away summit is glorious in a bath of liquid peach bloom, the Chocolate range is sublimated into liquid rose-madder, shading down to vivid purple, while a range in the far distant east is bathed in every shade of red, from a tender blush rose to a deep and fiery glow.

For a few hours our eyes and senses rest. We go indoors to eat and in the pleasures of the table forget for a while the subtler joys of sight. Then we step out of doors again to enjoy the cool of evening, and in one great, wonderful moment our very souls are flooded with a new and delicious sensation. The moon has arisen. Its soft, silvery tide has flowed over everything and there are no longer any harsh mountains, any barren, desolate desert. All is sublimated, transfused into a dream of calm, quiet, alluring beauty, that seems to steal into one's being through every sense

avenue. Nostrils, ears, touch, the pores of the skin, as well as eyes, take their dole of the prodigal wealth scattered broadcast from nadir to zenith and which has left nothing of earth untouched, and the soul itself seems to gently fall into a delicious restfulness that is a foretaste of the peace of heaven.

A perennial source of surprise even to the desert habitant are the marvelous varieties and the peculiarities of the tree and plant life: the palo verde, that wonderful prickly "green stick" tree, which has no leaves, only thorns, and yet which blossoms out in season into a gold more rich and gorgeous than Solomon's temple robes; the smoke tree that, from a casual look, may readily be taken for the ascending smoke from a camper's fire; the mesquite, full of thorns, laden with mistletoe of richest browns and



The smoke tree (Dalea spinosa)

greens and reds, and that also has a wealth of blossoms; the thousand and one varieties of cactus, each possessing its own colors; the creosote bush everywhere present, and in the late winter one of the most beautiful shrubs I have ever seen, clothed in a rich, waxy, deep green, enlivened with its yellow blossoms and pure white, fluffy, cotton-like seed pods. Then the desert willow, that anomaly of desert plants,—a water plant residing on the desert,—with its soft green leaves and its beautiful flowers, what a surprise it is! To be riding up a narrow canyon with bare walls of solid and ragged rock on each side of you, a few shrubs and plants scattered here and there on the "floor" of the canyon as you journey, and then, suddenly, to find a rich green tree, covered with beautiful white, pink, and purple blossoms,

is like meeting a desert friend in the crowded streets of a city of high walls and hot stones.

I have often wished I had been present to observe the surprise and delight that must have come over the first European traveler who discovered the palms of the desert. How he must have thrilled! Even to-day I never catch sight of the groves in the foot-hills to the northeast of Indio, and see the stately fringed leaves swaying and tossing in the breeze, but a sensation comes over me as if I had suddenly been picked up in an air chariot and whirled away to some new land. Then, when one finds them in the canyons, and, stranger still, right out in the heart of the desert, he begins to feel an affection for them that, once rooted in one's heart, can never be effaced.

Another great surprise connected with the plant life of the desert is the way in which the flowers and Bermuda grass come up after the rains. There will be no indication of either literally for years, — neither a flower nor a blade of grass. Then, suddenly, a shower will come, and as if by magic flowers and grass appear. Where have the seeds been all these quiescent years? What has preserved them? How have they retained their vitality?

Of the wealth of the desert flowers I have written elsewhere, as also of the marvelous growths of planted trees and fruiting plants. The way gardens and orchards spring up when intelligence guides their planting and the proper handling of the soil and water in irrigation form the subject of a complete chapter, and yet even there not a hundredth part of the story is told. From the wild plants of the desert that seem to be bleached by the heat of the tropical sun, to the rich green of a fig tree and vine, each of which I have seen bearing, the first in the second year after planting, and the latter *three months* after, the whole of the verdant life of the desert is a matter of surprise, and the more you know of it the more wonderful does it become. Think of vast crops of Bermuda onions, sweet potatoes, oranges, grapes, figs, pomegranates, almonds, dewberries, strawberries, and *car-loads* of watermelons and Rocky Ford cantaloupes being shipped from the desert. Look at the groves of date-palms rapidly coming to maturity and telling of the time when the whole United States will be sup-

plied with this rich and delicious table delicacy from this region alone and then ask of the desert, "Is not this a surprise?"

Nor is this all! The speed with which trees and plants mature and the early ripening of the fruit are never-ending sources of surprise even to me, who, ere this, I suppose should have learned to get over being surprised. But to see fig trees three years old that are as large as trees elsewhere would be accounted large after ten years' growth, and to see grape-vines, planted as cuttings, at three months old bearing bunches of grapes weighing two and three pounds still affect me with great surprise each time I witness them.

An artesian well on the desert

And the greatest wonder of it all is the presence of the one indispensable thing that makes it possible,—water. A few years ago water was scarcely to be found on the desert. Then the railway bored a well. That one boring changed the whole character of a part of the desert as by magic. It was a flowing artesian well. Since then scores of such wells have been bored and all throughout the Coachella Valley, down as far as the Salton Sea, millions of gallons are flowing away unused. Boston, Washington, New York City, with all their wealth, do not enjoy such a marvelous flow of water as does this part of the "desert."

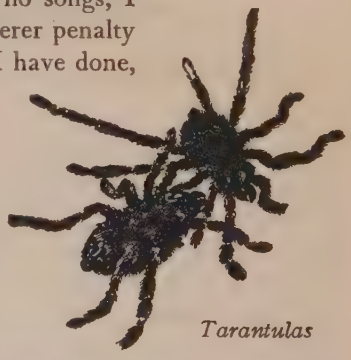
Of course I remember that in the canyons and elsewhere there

were hot and cold springs, but these, strange though they were, excited not a thousandth part of the surprise that the ordinary observer experiences when, for the first time, he realizes the vast flow of water the artesian wells of the desert afford.

Yet, on the other hand, is not this surprise in itself a source of surprise? Why should there not be vast quantities of water underlying the desert? With Mounts San Jacinto, San Bernardino, and San Gorgonio close at hand, all of them covered with snow throughout the whole year and thus acting as feeders of inexhaustible underground reservoirs, it would be surprising indeed if none of this found its way into the bottom of the desert bowl by their side.

Chuckwalla with banded tail

With water outflowing in half a thousand wells and producing richest verdure and sweetest fruits one might naturally expect a large number of birds, and yet their presence is a never-ending surprise. In number of varieties, and the sweetness of their songs, even the ornithologist is surprised. As for the *intelligent* (?) Eastern observers who go away and spread abroad the false report that the birds of California have no songs, I should like to award them no severer penalty than to compel them to listen, as I have done, to the bubbling fountain of song that wells up from our desert mocking-birds, the "pip, pip, pip," of the quail, the gentle piping of the canyon wren, the sweet singing of the linnets, the "fine careless rapture" of the meadow larks, the fairy notes of the humming-birds, the saucy scolding of the jays, and the harsh call of the bluebirds, — all of which may be heard in one day on the Colorado Desert.

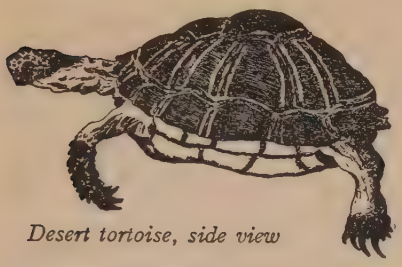


Tarantulas

Nor does this take into account the vast numbers of aquatic birds found on the flats of the Colorado River and the Salton Sea,

the millions of ducks, geese, herons, cranes, swans, and pelicans, none of which one would expect to find in such a desert region.

The animal life of the desert, too, affords one plenty of surprises, for not only are there the coyote, the fox, the badger, the gopher, the chipmunk, the wildcat and the field-mouse, but we find the cunning trade rat that takes away from one's residence some article, but always leaves a stick for each object taken (hence his name), the antelope, the deer, the mountain sheep or bighorn, — which is growing more scarce each year in the United States, — and the brave and powerful mountain lion. Add to these the various reptiles, such as the gila monster, the rattlesnake, the side-winder, the chuck-walla, the lizard, the desert tortoise, and the horned toad, and such insects as the tarantula, the scorpion, the centipede, and a score of other strange "bugs" that now and again catch the eye, and one feels that in the animal life alone he has enough for the study of a lifetime.



Desert tortoise, side view

To say that one might step out from his back door and in a few minutes pick up in his hands twenty-two fine, large, edible fish would be regarded as a surprising statement for any locality. But when it is asserted of the heart of the Colorado Desert it becomes almost unbelievable. Yet it is literally true. On the last Saturday of March, 1906, a rancher near Mecca actually picked up twenty-two fish, one of which I took to Professor C. F. Holder of Pasadena for identification. I account for the presence of these fish as follows: During the outpouring of the Colorado River into the old Alamo channel many of the fish of the river found their way into the Salton Sea. In March of 1906, the rainfall in the San Bernardino Mountains being excessive the

Horned toad (Phrynosoma platyrhino, GIRARD)

lower portion of the Whitewater River carried quite a stream to the Salton Sea. The fish, coming in contact with the purer, colder water of the Whitewater, naturally followed it and thus, when the unusual flow subsided, they were caught in a natural trap, caused by a pocket in the stream which retained water after the course elsewhere had dried out.

One of the young men of the household, out shooting rats, mice, gophers, etc., at dusk, heard a peculiar noise in the bushes behind him, and seeing nothing, on hearing it again fired blindly in the direction of the noise. In the dim light he could find nothing that he had shot, but going to the spot the next morning he found three fish killed by his gun. Thus the presence of the fish was discovered and the other twenty-two captured.

The Indians are full of surprises. To see them hard working,—men and women alike,—self-respecting, sober, diligent, attentive to their own business, reverent churchgoers, faithful husbands and wives, loving parents, dutiful children, respectful citizens, some of them first-class farmers, good mechanics, and skilled laborers, and the women fine basket-makers, is to be filled with surprise. Then when one hears them tell their folk-lore stories, sees them in their fire-dance, listens to their songs of creation, a single rendition of which requires three all-night sessions, his surprise is increased to wonder.

An Indian "kish" with granary on roof

I suppose I ought not to be surprised at the Salton Sea, yet it is one of the most wonderful things the whole desert presents to me. Each time I see it, and every day I am upon it, or travel on its shores, or see it from the far-away mountains, it awakens the deepest emotions of surprise. A sea upon the desert! A sea in the heart of a blistering, scorching region of sand! Who can help being surprised, if his brain is habituated to thought? The wonder of it! The strangeness of it! The beauty of it! The majesty of it! The novelty of it!

It is all very well to account for its existence (as I have most

clearly done in the chapter devoted to the subject), but none the less the wonder and surprise remain. It is an anomaly, a physiographic anachronism, unexpected and for which the mind will not be prepared, and to which it will not become accustomed. And how glad I am that there are some things to which I cannot become blasé. To keep one's emotions and sensations of body, mind, and soul alert and awake, sensitive and receptive, is to live, and to live abundantly. May I ever be kept from the mental attitude that refuses to be surprised, that declines to yield to wonder, that regards enthusiasm and emotion with disfavor.

One never gets over the clarity of the atmosphere of the desert, its purity and, better than all, its healing quality to those whose lungs or bronchial tubes are diseased. The healing power of the desert is one of its happy surprises. To see a man of mental power and activity, capable of long and continued service to his fellow man, anxious to work, well equipped for it in every way, smitten by disease and in a few short months brought to a state of physical emaciation and exhaustion, mental inertness and spiritual quiescence, is to be filled with sadness and sometimes with despair. But to see this poor, decrepit creature, with one foot apparently in the grave, and the other rapidly following its fellow, brought upon the desert, and there wrapped around day and night with the healing power of the sun-laden atmosphere, subject to the direct vivification of sun, wind, and dry air, and then to watch his sure recovery to health, strength, courage, power, and usefulness, — this is to rejoice and be glad; this is to glorify God for this His wonder garden of health. And I have seen this so often in the past twenty-five years; I myself have shared in its joys. Is it not a surprise to enjoy, to see the dying brought back to life, to see despair driven back by renewed courage, to hear the lamentations of friends change to rejoicings, and then to catch echoes from the great outside world of business, literature, art, science, and statesmanship of the manly work done by those who but a few short months before were brought to the desert as almost ready for their graves? Yes, indeed, the wonderful restorations to health are among the greatest and most-to-be-desired of the surprises of the desert, and they will grow in number and power as the friends of the sick learn to send their ailing loved

ones *earlier* to this place of recuperation, renewed strength, and new life.

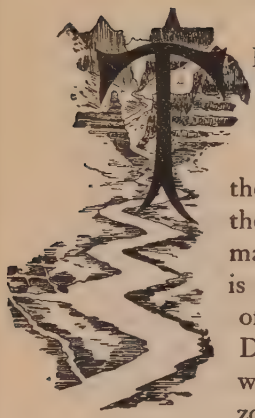
In concluding this necessarily hasty and cursory survey of some of the surprises of the desert it seems to me that one of the greatest surprises of all is the ignorance of well-informed people that the desert contains so many surprises. Yes, critic, I see the Hibernianism of the remark, but I am willing to let it go. We are a mentally alert nation in some lines, yet in others we are asleep and inert. The desert has been here for ages, was here waiting for us to know and understand when we first took possession of it. Why have we so neglected it, so flouted it, so steadily refused to cultivate its acquaintance? Is it to the honor of any man that he refuses the acquaintance of one who quietly and calmly offers him every opportunity for personal association, and who later, by another, is discovered to be most worthy, noble, and exalted?

The desert is the friend of man. It is full to overflowing of blessings. It is no mere fiction to call it "the Garden of Allah." To you, my dear reader, it calls and says: "Come to me, know me, lean on my heart, and you shall gain new power, strength, courage, and wisdom. You shall learn, as never before, the way of life."

Idyllwild, in San Jacinto Mountains

CHAPTER IV

The Rivers of the Desert



THE chief river of the desert is the Colorado. Though I do not forget the wonderful interest caused by the explorations of Major J. W. Powell, which made the Grand Canyon system of the Colorado River known to the world, I venture the assertion that never before has the interest of man been so centered on the Colorado River as it is to-day. The government is spending hundreds of thousands of dollars in constructing the Laguna Dam, a few miles above Yuma, which is to supply water for irrigation to thousands of acres in Arizona. The California Development Company, five years ago, cut into its banks on the California side, diverted water into the old channel of the Alamo River, and conveyed it to the so-called Imperial Valley (a portion of the Colorado Desert below sea-level), poured it into scores of miles of canals and thus distributed it to thousands of acres of thirsty lands which merely awaited its coming to blossom as the rose and produce with marvelous fecundity, and thus give homes to nearly twelve thousand people, with room for hundreds of thousands more. Owing to careless construction in the head-gate of this irrigation system, which caused the silting up of the canal and a consequent shortage of water, another harmless-looking cut was made in the Colorado's bank, below the Mexican line, in 1905, and surprised by unexpected floods this small cut has widened until it is now nearly a mile across, and through it is pouring the whole of the waters of the Colorado, gathered in Utah, Wyoming, Colorado, New Mexico, Nevada, Arizona, and California, so that the bed of the river below this cut to the Gulf of California, a distance of some one hundred and thirty-five miles, is as dry as a board. And this water, un

tamed and uncontrolled, has remade two almost forgotten rivers, the New and the Alamo; has partially washed away two towns, Mexicali and Calexico; has entirely flooded and destroyed the town and salt-works of Salton; has refilled the sink of the Salton until it is now an inland sea, nearly fifty miles long, and five to twenty miles wide; has flooded and carried away forty miles of the track of the Southern Pacific railway, compelling the complete abandonment and rebuilding on a higher level of that distance of railway; and is now threatening (at this present moment of writing, July 9, 1906) the recently moved tracks so that engineers are determining where they shall be placed if the inpouring of the waters cannot be stopped. The unusual continuance of flood waters in the Colorado has been Nature's positive refusal to allow man — the most competent and skilled that money and science can command — to fill up the once harmless-looking cut in the Colorado bank, so that boards of noted engineers of the United States, Mexico, Southern Pacific, California Development Company and others, officially and unofficially, have gravely studied the matter as one of international and, indeed, world-wide importance.

These, then, are some of the reasons for the wide-spread interest in the Colorado River, the Nile of America, altogether leaving out of consideration the fact that if the flood does not cease the twelve thousand inhabitants of the Imperial Valley, with their orchards, farms, ranches, and stock ranges and their towns of Imperial, Brawley, Calexico, Mexicali, Holtville, Heber, El Centro, and Silsbee and the towns of Mecca, Thermal, Coachella, and Indio, with the Indian villages of Martinez, Agua Dulce, and Torres in the Coachella Valley will be submerged as was Pharaoh's army in the Red Sea.

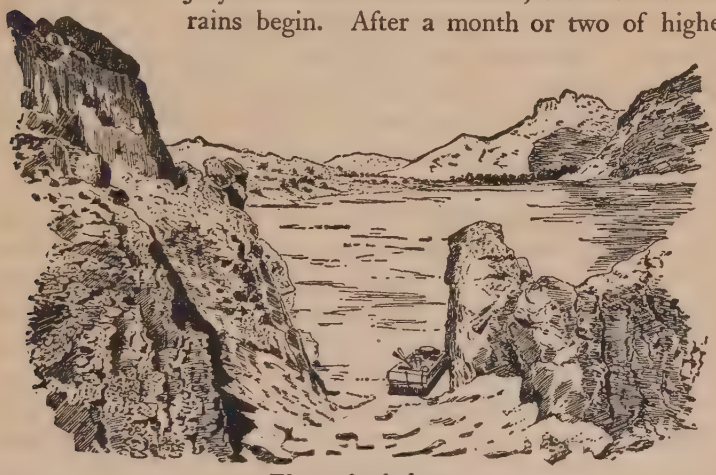
With these facts and fears connected with it there is no wonder that the Colorado River is now the most observed river of the world.

Of the history of the discovery of the river by Alarçon from the Gulf of California, and Cardenas from the rim of the Grand Canyon, the explorations of Padre Garcés, Hardy, and Ives, the adventures upon it of trappers and prospectors, the scientific and determinative explorations of Powell and Stanton, and the

latter-day navigations of it by Captains Polhamus and Mellen, I have not now space to write.

Elsewhere I have shown how it has been the carrier of all the sand and silt that have made the Mohave and Colorado Deserts, and how it is now filling up the Gulf of California so that, in ages yet to come, new deserts will appear where now tides and bores play havoc with the sand-bars and help distribute them to make way for more.

It is an uncertain river, is the Colorado. Generally it runs quietly and sluggishly through the desert from about the end of July to the end of November, when the winter rains begin. After a month or two of higher



The author's boat

water, it sinks back again to a low level until about the middle of May when the snows begin to melt in the far-away mountains where the winds have carried the moisture during the winter. Then for over two months (as a rule) the sleepy, sluggish giant is roused to an activity that is demoniac in its power and blind, undirected, uncontrollable fury.

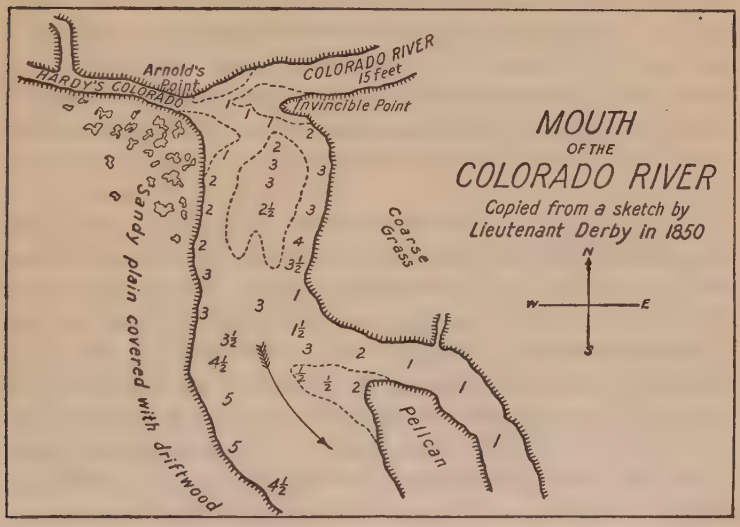
Few rivers have such a life-history as the Colorado. Rising in the snowy peaks of the mountains, the trickling rivulets of the purest water of earth, distilled from perpetual snow-banks, unite to form rills; these in turn unite and make rivulets; the rivulets unite and form the creeks that empty into small Alpine lakes.

There are two rivers that join to form the Colorado,— the Grand and the Green. The sources of the Grand are in these Alpine lakes five or six miles west of Long's Peak. As the small creeks pour their waters into the lakes, they overflow and discharge into a common reservoir known as Grand Lake. Towering cliffs and crags of granite mark its eastern shore, and stately pines and firs occupy its western margin, all of which are reflected on its pure and placid surface.

Green River heads in the Wind River Mountains of Wyoming, near Fremont's Peak. Small Alpine lakes by the thousand contribute each its quota to Green River, which being larger than the Grand is regarded as the upper continuation of the Colorado. The source of the Grand is in latitude 40° 17′ and longitude 105° 43′ approximately. The source of the Green is in latitude 43° 15′ and longitude 109° 54′ approximately. The mouth of the Colorado is in latitude 31° 53′ and longitude 115°. From the source of the Green to the mouth of the Colorado it is two thousand miles. The area drained by the Colorado is about eight hundred miles long and varies in width from two hundred to five hundred miles. It contains about three hundred thousand square miles, a territory larger than all the New England and Middle States with Maryland, Virginia, and West Virginia added, or nearly as large as the five great states of Minnesota, Wisconsin, Iowa, Illinois, and Missouri combined.

More than two-thirds of the length of the Colorado and Green Rivers pass through a mountainous or plateau region where the water is as pure and sweet and fresh as mountain snow water generally is. From under the snow it flows; then over the rocks, jumping, splashing, sparkling, murmuring and "guggling" like a happy child. Now in the form of rapids, then in cascades, or falls, churned and dashed into foam, or flowing along in smooth, rocky channels with nothing but gentle lappings and sighings, sung over by the lark, vireo, linnet, and sparrow, and bathed in by the little folk of the earth and air, watched over by sweet-scented roses and larkspur and lilies, and shaded by the beautiful foliaged poplars, quaking aspens, sycamores, alders, and cotton-woods, it flows merrily and laughingly along. New streams add their pellucid waters to it and it grows in power and volume

until it is a river of size and power, a stream of dignity and appearance. Then it enters the canyon region, where it has its own definite waterway cut by the corrasion, erosion, and battlings of the centuries into massive cliffs that are the wonder and admiration of the world. Flaming Gorge, Horseshoe Canyon, Kingfisher Canyon, Canyon of Lodore, Echo Canyon, Whirlpool Canyon, Split Mountain Canyon, Canyon of Desolation, Gray Canyon, Labyrinth Canyon, Stillwater Canyon, Cataract Canyon, Gypsum Canyon, Narrow Canyon, Glen Canyon, and



Marble Canyon are names which suggest the pathway of the river before the Grand Canyon is reached. Of the Grand Canyon I have elsewhere written fully.[1] It is confessedly the most stupendous and awe-inspiring piece of natural scenery now known to man.

Below the Grand Canyon, which terminates at the Grand Wash, there are Iceberg Canyon, Virgin Canyon, Boulder Canyon, Black Canyon, Painted Canyon, and Pyramid Canyon before

[1] In and Around the Grand Canyon of the Colorado River in Arizona, 346 pages, 100 illustrations.

the river enters the desert portion of its pathway just above Fort Mohave. And what a change is here! During all these miles of canyon travel the river has been the most impetuous, unrestrained, untamable, and powerful of American rivers. It has dashed noisily along — not rolled but *dashed* along with irresistible force, over roaring rapids and long cascades, with clash and roar keeping up its ceaseless warfare against the rocks that enslave and confine it. For centuries the battle has raged,— a conflict never at rest for a moment. Though whipped into foam, dashed into bubbles, churned into froth, splashed into yeast and shattered into mist; it has kept up its leaping, beating, striking, and worrying, cutting into and undermining the cliffs and springing upon them with incalculable power and fury when, broken and shattered, they fell into the trough below. Ah! what battles the sun and moon have witnessed as, in their silent and stately marches, they have looked down over this region of canyon and gorge.

Then the mountains to the north burst forth with melted torrents of fiery lava which flowed to the side of the canyon and over into the trough where a new conflict began. Water and molten rock! What a struggle; what a seething and boiling and hissing! But the river won. It was not to be defeated. The fiery lava was changed into cold stone, and pillars and coatings of it now stand and line the canyon walls while the unconquered and unconquerable river still rolls on as it has done for countless centuries.

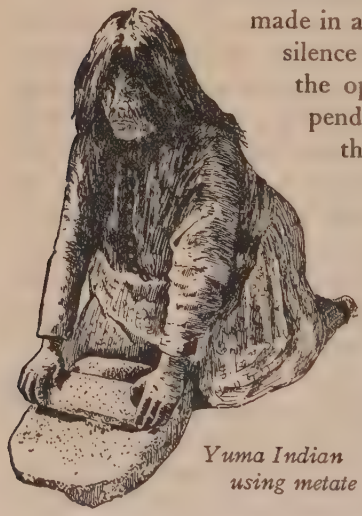
Now the end of its warfare has come. It has reached the desert. There are no more rocks to battle with. It has demonstrated its supremacy. It is growing old. So like a lazy giant it stretches, and sprawls, and creeps sleepily along, heavily, sullenly, and so silently, that one might not know it were there did he not hear, now and again, the splash of a jumping fish or the boiling up of an undercurrent. Laden with silt and sand, caused by the grinding of the millions of tons of rock that have fallen into its canyon path, it moves heavily. Most of these rocks contain red oxidizations which have colored the water until it is a peculiar red, and *Colorado* means red. Though the old conquistadores named and renamed the river, Alarçon calling it the Rio de Buena Guia (the river of good guidance), from the

Viceroy Mendoza's motto; Diaz, the Rio del Tizon, from the habit of the natives of carrying about with them firebrands to keep themselves warm in the chill autumn air, it *was* and *is* the *Colorado*, because it *was* and *is* the Colorado, the red, both in walls and water. Whatever other colors are there the red predominates, twenty to one, hence no one can question the appropriateness of the name.

The sand and silt carried down are what have made the desert. Only such a river, with its origin at a tremendous elevation above its mouth, could have had the carrying capacity to bring down such a vast amount of deposit as has this river. When we watch the processes of man in removing earth, — the plow and the scraper being his implements, or even the steam shovel and the dredger, — and consider how slowly and on what a small scale he works, we begin to realize the gigantic power of natural forces. Nowhere are these more apparent than in the carrying ability of the waters of the Colorado. I have seen a mass of sand and silt over a mile long and from six to twelve feet high deposited in a few days during the flood season, and the following season I have seen it carried away in a few hours. Because it works silently and is generally sullen and still, it must not be thought powerless and always tractable and gentle. The engineers who, for over a year, have been trying to tame it below Yuma, have found out how mistaken such an idea is. One by one their efforts were demonstrated futile. Piles and steel cables, mats and brush filling, by the thousands of tons were whirled away as if in sport and derision. An island stood near the intake of the canal of the California Development Company less than six months ago. It was a mile long. The engineers tried to anchor one of their dams to it, but the river objected and began to cut away the island, and to-day not an inch of it remains. I have seen the engineers of the Santa Fé railway, near the Needles, with great gangs of men working day and night to prevent the river from cutting away the bluffs upon which their tracks ran, and that a month before one would have declared safe for a thousand years to come, and yet the engineers were driven back and trains were held up for ten, twenty, thirty, forty hours until the tracks could be removed and replaced.

It is a silent river, yet it has washed out bridges at Needles and Yuma and compelled both railway companies to seek places where their piers could be anchored deep in solid rock and cement, ere their new bridges could bid defiance to its power.

I have seen a monster steamer drift down with its current and on to the canal made by the overflow and in two hours travel about twenty miles. On its return journey it required ten hours of hard battling to make the same distance. When I rowed down from Needles to Yuma it took me fifteen days (eight or ten only of which were spent actually on the river), but in flood time the three hundred miles have been made in a day and a half. So that even its silence and laziness now that it is out in the open of the desert cannot be depended upon. Indeed there is but one thing in which it can be depended upon, and that is its wilfulness and undependableness.

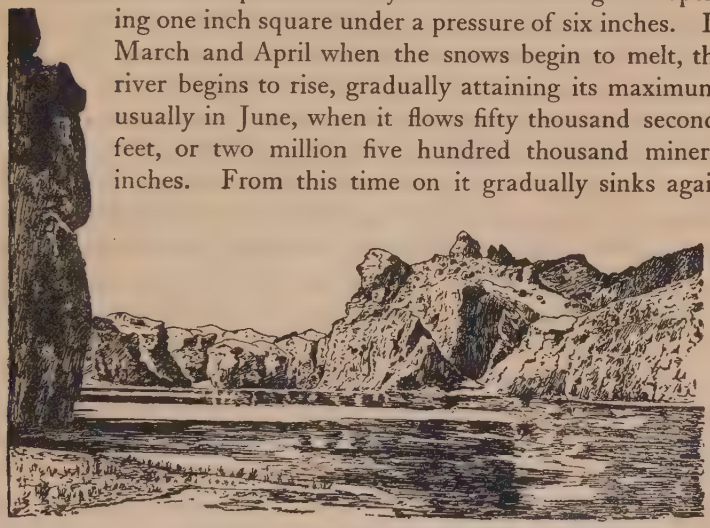


Yuma Indian using metate

Even to its dusky children, the Yumas and Mohaves and Cocopahs, it is, at times, a very cruel stepfather. Time and again it has washed over their whole reservation, as it did in 1905 and 1906, flooding almost every "kan" of the Yumas, and compelling them to flee to the high ground for safety. Levees to prevent it are almost useless, for, if it takes a mind to it, in a few hours it will cut away the whole country on which the levees are built. The inhabitants of Calexico and Mexicali found that out during their critical time in June and July, 1906, when the river, running in wild flood down the Alamo and New Rivers to the Salton Sea, began to cut into their towns. They used dynamite to cut out a passage for the mad waters and tried to prevail upon them to flow in it, and for a while all was well, and then, suddenly, the river took a destructive streak and began to attack the bank near the town of Mexicali and in a few hours half a street of

houses tumbled into its turbulent flood, were crushed and crumbled to pieces as if in derision and scoffing, and in a few minutes had disappeared forever.

We have seen that the flow of water in the Colorado is a most variable quantity. From about September first to March first of each year while the snow is frozen on the mountains, except for occasional floods, the river is low, reaching a minimum flow of about four thousand second-feet, or two hundred thousand miner's inches, during that time. A miner's inch is the amount of water that will pass in twenty-four hours through an opening one inch square under a pressure of six inches. In March and April when the snows begin to melt, the river begins to rise, gradually attaining its maximum, usually in June, when it flows fifty thousand second-feet, or two million five hundred thousand miner's inches. From this time on it gradually sinks again



Colorado River below Needles Bridge

to a slow stage in August and September. From time to time throughout the year, especially in the summer months, the river is subject to sudden small rises originating in torrential downpours on the Arizona watershed, but the manner and character of these floods distinguish them from the main flow.

So long as the Colorado River was regarded merely as a river, a factor in the landscape, a natural feature incapable of serving man except as a means of transportation and pleasure, the amount of sediment it contained and its character were of no great moment. But when it was determined to rob the river of some of its flow

and divert it upon the land for purposes of irrigation it became a matter of great importance to determine these things. For upon the amount of sediment it carried many engineering calculations had to be based, and upon the quality of the salts and silts largely rested the life of the irrigated district. It has been found by expensive experience that waters containing too large a proportion of common salt and the sulphates of sodium, potassium, and magnesium render the lands they irrigate useless. To determine these matters, therefore, in regard to the Colorado (and other Arizona streams), the Arizona Experiment Station, in 1899, began regularly sampling its waters. The method of sampling is interesting. A stoppered tin cylinder, thirteen inches long, two inches in diameter, and holding about one and one-half pounds of water, was slung in a wooden support having a handle by means of which it was submerged in the river, from six inches to a foot below the surface and with its mouth upstream. The rubber stopper was then pulled out by means of a cord or wire, and as soon as the cylinder was filled it was withdrawn from the river and instantly emptied into a demijohn. A number of daily samples so taken were combined and the testing of them took place at the chemical laboratory.

Owing to its great length and the rocky canyons through which the upper two-thirds of its flow occurs the amount of sediment contained in the Colorado is far more constant than it is in such rivers as the Bill Williams, the Salt and the Gila which receive the run-off of watersheds subject to torrential rains. These severe rains sweep the floor of the desert regions through which they pass and, at such flood times, largely determine the physical character of the main river's sedimentation. The sediments that are the result of canyon erosion form a dense mud, reddish gray in color. These come in April, May, and June. When the summer floods come from such tributaries as the San Juan, the Colorado Chiquito (the little Colorado), and the Havasu the yellow and red colors predominate, while, when the flood waters from the Gila predominate, the Colorado below Yuma sometimes becomes repulsively black.

Conservative estimates show that in 1900 the Colorado River brought down not less than sixty-one million tons of silt which,

condensed into solid rock, is enough to cover twenty-six and four-tenths square miles a foot deep; or to make fifty-three square miles of dry, alluvial soil one foot deep; or to make about one hundred and sixty-four square miles of recently settled, submerged mud one foot deep, reckoning the whole amount of mud for the year to average six and two-tenths times the bulk of the solid sediment.

In 1903 and 1904 (September to August inclusive), ninety-five million tons of sediment were carried by the river past Yuma, and this did not include the sand pushed along the bottom. One day alone, when the Gila had poured a muddy flood into the Colorado, one million eight hundred tons were carried by. It will be seen, therefore, that this year far exceeded that of 1900. The sediment of 1903 and 1904 would have made a mud bar ten feet deep and approximately twenty-five square miles in extent; or about eighty square miles of dry, agricultural soil one foot deep.

With such facts, clearly demonstrable, before us, can we wonder at the reach of the imagination which sees in the Colorado Desert sands the changed rocks of thousands of feet of plateau region strata, and that pictures for the future the Gulf of California converted into land, irrigated by the continuing waters of the Colorado River which conveyed the land to its present situation, and thus made the home of thousands of happy, contented, and prosperous people? Indeed, to demonstrate the possibility of such a thing becoming an actuality it may be stated that the boatmen of the Colorado River familiar with conditions at the gulf assert that during the past forty years the Colorado has advanced some fifteen miles into the gulf.

The amount and weight of these sediments occasionally produce unexpected and tragic results. Poor Pete Maguire, blind through cataract, finding his boat drifting away from the bank, owing to his companion's carelessness, jumped into the river intending to swim ashore. But so heavy was the sediment that it weighted him down and before help could reach him he was drowned.

The fertilizing value of the sediments lies mainly in the amount of nitrogen they contain, though potash and phosphoric acid are also present. Few rivers contain so large a quantity of the

valuable nitrogen. In this particular the Colorado is analogous to the Nile. Its salts, too, have a decided value in neutralizing the sodium carbonates of black alkaline lands.

Thus beneficent Nature works good in two ways. The irrigable areas of the desert contain large spots of alkaline lands which, flooded with these Colorado River waters, are leached out, while the deposition of the nitrogenous elements in the sediments adds needed factors of nutriment.

Of my own trip down the Colorado River from the Needles to Yuma, alone, a few years ago, I cannot here write, nor of the wonders of the river below Yuma.

There are other rivers on the desert as well as the Colorado. I know the look of credulity that will come over the faces of many as they read this statement. Yet I repeat it. There are the Alamo, the New, the Whitewater, the Carrizo, and the Mecaroni. Strange rivers, indeed, all of them, yet rivers of importance and interest, and were they not strange they would scarcely be appropriate to the desert and harmonious with the other objects found there.

THE ALAMO RIVER

The Alamo is a prehistoric river, with a history of intermittent flow, and now, in part, almost as large and important as the Colorado. In prehistoric times it was the connecting link between the Colorado and the Salton Sea. Elsewhere I have shown that for a long period after the Salton region was cut off from the Gulf of California it must have been a fresh-water lake. The source of its water was the Colorado River, and if the whole of the flow of the Colorado entered the Salton Basin then the channel we know as the Alamo was the Colorado River of that day. It is by no means as unreasonable as it may seem to assume that the whole of the Colorado River once flowed into the Salton. When the natural alluvial dam was thrown up by the Colorado's flood waters it may be possible that the dam was on the lower or gulf side of the flow and that the river thus emptied itself into the basin above the dam. Or it is possible to conceive that the river flowed into the gulf after the natural dam was made, and that long after the evaporation of the isolated gulf waters had

taken place, another flood broke a channel through the dam and thus allowed the filling up of the basin again with the fresh water of the Colorado. The channel by which this was effected was the Alamo.

In historic times there has been no constant flow in the banks of the Alamo except, as I shall shortly relate, within the past five years. Only when the Colorado overflowed could the Alamo be called a river, and then its dignity as such was lost in the course of a few days, or as soon as the flood subsided. During the Sonoranian emigration in 1849 and 1850 and the later years of the gold excitement we often find references to the joy of the weary travelers in finding a stream where they did not expect it. This applied to both the Alamo and the New, which had a similar history. As the overflow ceased the water in the channel of the Alamo subsided, but, as some portions of it were deeper than others, lagoons would be formed, which remained until their waters were carried away by evaporation. These lagoons are a frequent source of happy comment in the narratives of the gold seekers.

When the engineers of the California Development Company made their preliminary surveys in order to determine how they could best convey the waters of the Colorado River for irrigation purposes into the Imperial Valley, they discovered this old Alamo channel. I say "discovered it" advisedly. They learned for the first time its complete course and found that it connected with the Salton Basin. Here then was a channel already made, the lower end of which would serve as a main canal to convey water to the region to be irrigated, and the upper end of which would act as a channel through which waste waters could be conveyed to the Salton Basin. When the system was installed the Alamo was thus utilized. As far as Sharps — seven miles east of Calexico — it became the "main canal." There head-gates were put in which diverted the water to the distributing canals, and what was not needed was allowed to enter the upper channel of the Alamo and flow to the Salton.

When, in 1905, the upper part of the cut canal leading into the Alamo from the Colorado River was found to be silted up, and Mr. C. R. Rockwood cut the small channel from the Colorado,

below the silted-up canal, to allow the water to flow and thus save the farmers of the Imperial Valley from ruin, he became the instrument of fate in permitting the people of this day and generation to see what nature itself had done in prehistoric times, and had then abandoned. For, as is well known, owing to unusual floods, the whole of the flow of the Colorado was soon diverted through this cut into the Alamo channel, and for several months and at this present time of writing (July, 1906) there is no Colorado River below the lower intake, as the whole of its waters are running by way of the Alamo to the Salton Sea.

But a change will doubtless soon be made. The dam will be constructed across the cut, the head-gates are already in place, and ere this book is in the hands of the public I confidently expect to see the Colorado restored to its old, that is, its *recent* historic channel, and then the Alamo will once again be changed from its estate as a great river flowing independent of the will of man, working great injury to his schemes and plans, and made subservient to that will as an irrigation canal, conveying water under his control for the beneficent purposes of sustaining life and promoting man's prosperity.

The story of my descent of the Alamo forms an independent and later chapter.

NEW RIVER

The first reference I can find to the "New River" is in Bartlett's Narrative of Explorations in 1850–53. Writing of his camp at Alamo Mocho he says: "About twenty-five miles back from this place we crossed a ravine or arroyo some twenty or thirty feet wide, and about ten feet below the surface of the desert, that forms the bed of what is known as 'New River.' Three or four years ago this ravine was filled with water, as well as a large basin connected with it. The water suddenly appeared here, and by passing emigrants was hailed as a miracle and direct interposition of Divine Providence, like the manna furnished to the Israelites of old. This phenomenon is now well known to proceed from the Colorado River, which some years rises to a great height, overflowing its banks and the adjacent valley, and sometimes running back through lagoons and depressions in the desert for many miles. It

was one of these great risings of the river that caused the sudden appearance of the mysterious 'New River' of the desert, which remained two years, and then dried up. By similar inundations the great basin at Alamo Mocho has doubtless been, and may again be filled. I was told by persons in California who had crossed the desert, that they had found pools of brackish water several miles from the road. These I presume to be deeper basins, where the water stands longer than in the 'New River' or the dry basins passed by us."

Another writer of about the same time asserts the belief that this New River had its source in a lake "which had bubbled up spontaneously."

We now know that the modern history of New River is very similar to that of the Alamo. It has its source, however, in Volcano Lake, a variable body of water in Lower California, some thirty-five miles southeast of Calexico. This lake receives water from the Colorado by means of the Rio Paredones, for, strange to say, this "tributary"— as it is often regarded — really "taps" the Colorado and conveys its waters to Volcano Lake. During flood seasons the Paredones not only supplies Volcano Lake, but spreads out over considerable country to the northward and contributes directly to New River.

Volcano Lake is situated on a divide of slight elevation so that, while some of its waters flow to the north by means of New River, the larger amount flows south as Hardy's Colorado and empties into the gulf.

This was the normal history of the New River until the advent of the California Development Company. The plans of this company required that two miles beyond where the Alamo discharged its waters into the main canal of the Imperial country, the main canal in turn should empty its surplusage into New River, which then conveyed it to the Salton Sea. From the map it will be seen that New River flows in a general northwesterly direction from Volcano Lake to Calexico and Cameron Lake, spreading out above Silsbee and spasmodically feeding the small marshy lagoons known as Blue, Diamond, Badger, and Pelican Lakes. Then curving around it strikes to the northeast up to near Brawley, where it irregularly parallels the Alamo River at about a mile

distance, and again curving to the northwest empties into the Salton Sea.

During the high flood season of 1906 New River got on the rampage and half wiped out of existence the town of Mexicali and for many days kept the inhabitants of Calexico on the anxious seat. While a large portion of the flood waters were turned into the upper Alamo at Sharps there was still a great flood that entered the main canal. In addition the north fork of the Rio Paredones was running full. There was still another channel by which the flood waters of the Colorado entered New River. On the map between Seven Wells and Sharps will be seen, on the south side of the Alamo, the outlet known as the Beltran Slough. This carries off considerable water when the flood is high, and though it scatters and "flows wild" over a large area of country, much of the water finally reaches New River. Here, then, were three sources conspiring to fill up the stream. Between Sharps and Calexico it cut into ranches and ate them up, converting the once fertile fields into scarred and gullied flood wastes. Two miles northwest of Calexico is Cameron Lake, and as the flood poured into it the bed of the river at the outfall began to "cut back." Higher and higher the river rose. Levees were built surrounding the towns, but the flood still rose and in some cases washed over them. On the thirteenth of June a stream was flowing through the railway depot at Calexico, the tank-house was an island, and the switch-bars arose above a turbid flood. Between the depot and the town a dike or levee was built on which whites and Indians worked, the former with the energy of desperation, the latter "like boys on the day the circus comes to town. They would just as soon rub sticks together or dip up water with a sieve — they pile sacks with just that much earnestness." Across from the railway track, looking toward the west, the river was fully seven miles wide.

For nearly a month this flood continued. Nearly five thousand dollars was spent on the levees of Mexicali and Calexico. Erelong the water stood against these to a height of four feet. About the twenty-sixth of June, when the river began to "cut back" from Cameron Lake, it was thought this would save the towns by deepening the channel and thus helping drain off the flood. In a few days this seemed to be accomplished, for the water against the levees was drawn off.

In forty-eight hours this rejoicing was changed to fear and dread. A small ripple appeared in the stream south and west of the Mexicali depot that grew rapidly. It soon became a channel and the water commenced cutting away the soil with a rapidity that was as astonishing as it was fearful. For in a few hours the foundations of the depot were washed away and the building itself floated off down stream.

The adjacent property became a prey to the devouring waters, and buildings which stood in its path were ruthlessly torn from their foundations and carried away. Then came a lull of thirty-six hours, during which dynamite was resorted to in an attempt to divert the channel.

While this work was progressing Nature was preparing for the carrying out of plans of her own. A storm that had been brooding over a section of country a thousand miles away at an unusual time of the year broke and sent its flood down the Colorado, into the Alamo, down the Beltran Slough and along the canal into the New River. The old channel was filled with a rapidity that was remarkable. Building after building succumbed to the action of the rushing waters, until it seemed that only the destruction of both towns would abate its fury.

Deeper and deeper the river cut and higher and higher grew the banks along its side. The men were unable to cope with the situation, although ton after ton of dynamite was used in an attempt to stay the destruction. Just as the water had washed away the first house of the group that remains in the town of Calexico, another change took place. The caving in of the banks became infrequent and then ceased.

The flood had subsided, and to-day, July 10, 1906, as I write, instead of a turbulent torrent of water rushing on its way to the Salton Sea, a stream about seven hundred feet wide and from ten to twenty feet deep flows past the towns, confined within banks thirty feet high and with a current of not more than six miles an hour.

As soon as the Colorado is returned to its original channel the flow in New River will become normal, — that is, it will be a small stream depending for its main supply of water from Volcano Lake and the surplusage from the main canal of the Imperial system.

THE WHITEWATER RIVER

Although one might travel over the desert many, many times and never see the Whitewater, it is nevertheless a most important *desert* stream. The qualifying adjective means much. A desert river may have as large a volume of water as an ordinary small Eastern river, but desert conditions are such that its largest volume may be underground. The Whitewater heads in the snow-banks and cienegas and springs of the San Bernardino Mountains and for a while flows almost west. It gives its name to the Whitewater Canyon, and also to the famous Whitewater Ranch in the San Gorgonio Pass. This ranch is now the property of the Bear Valley Water Company. It was once one of the stage stations, and many a weary traveler over the desert has almost wept with joy when his

The San Bernardino Mountains

eyes rested upon this exquisitely green oasis — the first seen since crossing the Colorado River. Even now, old prospectors who prefer to travel with their burros from the desert to civilization eagerly look forward to reaching the Whitewater Ranch. At Whitewater station, after a heavy rain, or when the snows begin to melt, the Whitewater appears as a veritable mountain torrent, dashing down with roar and clatter among, around, and over its boulder-strewn path. Then, impinging on one of the spurs of the San Jacinto range, it turns to the south and, hugging the western mountain bases until it passes about opposite to Indio, it turns to the southeast and flows into the Salton Basin.

It is a winter stream though it flows all the year in its upper reaches, growing less in volume as the summer advances. Below

Palm Springs, however, during the summer it has no exterior or apparent flow. It is, in truth, a buried river, forming in large part the great artesian water supply of the Coachella Valley.

Evidences of the shifting character of the lower flow of the Whitewater are found in several abandoned beds to the north and east. The shifting of the desert sands during seasons of drought where there was no flow in the river bed has forced it to the west and south.

In the winter of 1905–6 the Whitewater seemed to emulate its great desert brother, the Colorado. Its waters poured down, washed out the irrigation connections with Palm Springs, and dashed down over the Indio fields and roads to all the towns along the railway even as far as Mecca, washing out roads, bridges, and a few acres of land. It was at this flood time that the fish entered it from the Salton Sea as related in another chapter.

The Whitewater is the source of the irrigation water that has done so much to reclaim Palm Springs. There is a constant flow of some one thousand inches which might be utilized. But the ditches and conduits are not now in good condition; a Los Angeles bank holds a mortgage on them, and until energetic steps are taken to restore things to successful working order the priceless flow of the Whitewater runs to waste and the farms and gardens that should have it suffer from its loss.

CARRIZO CREEK

Bartlett says of Carrizo Creek that it is "one of those remarkable streams which sometimes spring up in desert regions. It rises in the very center of barrenness, flows for about a mile, and is again absorbed by the desert. It has worn for itself a bed about fifteen feet below the plain. It is from three to nine inches in depth, and varies from six feet to as many yards in width. Where the banks have been washed away it receives, in several places, accessions from springs; but when these cease, the stream grows less and less, until it is all absorbed by the sands."

THE MECCARONI RIVER

Water! How little city dwellers, who have a sufficiency of water, know what those five letters stand for on the desert. Noth-

ing is so precious as water; and yet, strange to say, on parts of the Colorado Desert water is not only running to waste, but is there in such abundance as to cause considerable trouble. Elsewhere I have shown the vast trouble and expense caused by the overflow of the Colorado River into the Desert Basin. At Mecca the artesian wells flow so freely and continuously that the reservoirs are all full, and at certain periods of the year the farmers do not know what to do with the water save let it run where it will. It breaks down the paltry ditch banks, overflows the roads and makes traveling most uncomfortable. Toward the southeast some of these stray waters gather together, forming a small creek which flows in an intermittent kind of way and finally empties itself in the Salton Sea. A local wag, well foreseeing in the laxity of pronunciation of his neighbors the degeneracy of the name he coined, termed it the Meccaroni River, and now it is seriously and unconsciously spoken of by every one as the Maccaroni River. At times it is quite a respectable-looking small stream, and until the land of the region is so cultivated that all the supply of water is needed, it will continue to flow into the Salton Basin.

A glimpse of San Jacinto Peak

CHAPTER V

The Mountains of the Desert

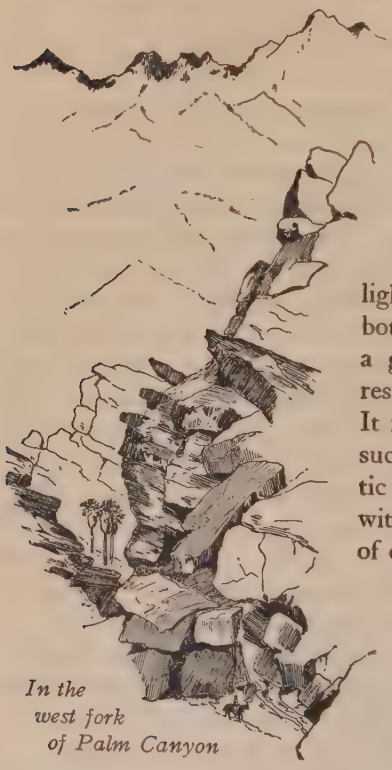
OUNTAINS on the desert constitute one of its chief charms, especially when to all their other sublimities they add the crowning glory of a cap of virgin snow. I shall never forget the varied emotions of pleasure, joy, and adoration that came over me early one morning as I got off the west-bound train at Mecca. The name itself, as the brakeman called it out, was suggestive of pilgrims, date-palms, heat, sand, and desert. The morning was crystalline in its clearness and cool enough to be deliciously stimulating to every nerve of the body. One breathed in the pure, vivifying air with delight and satisfaction. Walking over to camp the eyes instinctively followed the two ranges that shut in this desert basin, until they rested upon the towering mountains that sentinel the pass into the "Garden of Allah." Snow-crowned and pure they stood, solemn, calm, serene, immovable, — types of guardian spirits shedding beneficence on every hand.

I never look upon these mountains without recalling the story of the sentinel angel with the flaming sword placed at the Garden of Eden after the expulsion of the man and woman for their disobedience. That angel stood as a preventing spirit, — not revengeful, but punitive, — and typified, in the biblical story and in the old conceptions of Hebrew theology, the relentless justice of God that sent man forth into a world of sorrow and misery, of struggle and woe, of failure and despair, as well as of achievement and joy, because of his one act of disobedience.

Here, on the other hand, these two pure sentinel peaks invite one, lure one, not only to the serene and calm of the life of the desert, where civilization and its cruel strifes are almost

unknown, but they appeal also to the soul and bid it claim its own of purity, serenity, majesty, and peace.

Oh! blessed mountains of allurement, of suggestion, of provocation to the higher life, well worthy are you of the honored position you occupy — to stand at the gateway of the Garden of God.



In the west fork of Palm Canyon

On this March morning at Mecca the peaks were not only crowned with snow, but their shoulder robes were of ermine, composed of pure snow, and the deep green of the forests which at this distance looked perfectly black. Kissed by the early morning light, which gave a rosy glow to both masses, they shed a richness, a grandeur, a sublimity over the rest of the desert that glorified it. It requires no effort to worship at such a shrine. It becomes a mystic altar of marble-white approach, with piled-up, retreating terraces of color leading the eye to a grand choir of proud and heaven-aspiring pines, all surrounding the snowy fane of perfect purity. What wonder that rude and profane men are suddenly sobered and dignified by its swift effect when its majesty and beauty are suddenly revealed to them!

When you first look at the mountains they appear to be all alike, — big, brown, green, or red, rough and rugged, and that is all there is to say about them. But as you study them how astonishingly different they become in their outlines, shape, color, texture, and the material of which they are composed. And when the sun so shines that they become dimpled, then, indeed, there is no wonder that one is entranced by their bewitching beauty.

At sunset the mountain peaks are covered with a golden glory that no words can picture, and the whole of the western heavens are one exquisite blaze of color. Is this glory of the earth or of heaven? Each revelation of new splendor below seems to call forth a more perfect revelation from above. The mountains are more than matched by the sky, yet they become as comrades, not rivals, the one setting forth the rich splendor of the other. We seem to realize now as never before how that

> "The emulous heaven yearned down, made effort to reach the earth,
> As the earth had done her best, in my passion, to scale the sky."

Each was responsive to the emotion and movements of the other. Soon the stars came out in response to the invitation of the golden-tipped mountain spires, and the moon floated forth to caress the snowy crown. The palm trees waved their mysterious messages to the silvery clouds, which bore them away over the misty, dreamy purple of the far-away desert.

There are four supreme mountain peaks that belong to the Colorado Desert. These are San Gorgonio, San Bernardino, San Jacinto, and the Cuyamaca.

The two former are the chief peaks of the San Bernardino range. San Gorgonio has an elevation of 11,725 feet, and San Bernardino is about seven hundred feet lower.

San Jacinto is the chief peak of the range that bears its name. Its elevation is 10,805 feet.

The San Gorgonio Pass is 2,808 feet above sea-level. The general altitude of the San Bernardino and San Jacinto ranges where they enclose the desert is approximately 5,000 feet.

San Gorgonio Mountain is sometimes degraded by the name "Grayback," given to it by the early miners and trappers on account of its broad, flat back suggesting a louse. That thoughtful and dignified people should be willing to apply so degrading a name to so noble a peak is to me incomprehensible, except on the ground of indifference, or ignorance as to the sources of the nomenclature of these mountains. The names originally were given by the early Spanish settlers, at the time of the establishment of the Franciscan missions in California, and

later, when the priestly and other explorers traversed the desert region. San Bernardino is named after the saint of Clairvaux, and San Jacinto either after the Chamberlain of the Emperor Trojan, or the noted Polish saint, who was a member of the order of Saint Dominic, and who lived A. D. 1257. San Gorgonio (Saint George) was named from the saint universally honored, but generally known as the patron saint of England.

From the map it will be seen that the detached mountains between the Salton Basin and the Mohave Desert have names, as the Pinto, Cottonwood, Coxcomb, etc. Of this region Lieut. Williamson wrote in 1853: "Between these mountains and the mountains on the Mohave nothing is known of the country. I had never heard of a white man who had penetrated it. I am inclined to the belief that it is a barren, mountainous desert, composed of a system of basins and mountain ranges. It would be an exceedingly difficult country to explore, on account of the absence of water, and there is no rainy season of any consequence. I was informed by the commanding officer at Fort Yuma that there they usually had but one rain during the year, which fell in August."

I can confirm all that is said above, yet such is the persistent energy of man in the face of obstacles that it has been explored and the names noted on the map were given during the past half century by miners or prospectors and were generally used at first merely to distinguish them one from another. Custom has now hallowed the use, and most of them are commonly received and well known. The Pinto Mountains receive their name from the fact that they are "pinto" or painted, the word being a corruption of the Spanish pintado. The Cottonwood Mountains have a most beautiful oasis where several large, fine cottonwoods grow near what, on the desert, is considered an abundant supply of water. The Eagle Mountains were found to be the home of several eagles, and chuckwallas abound in the split-up rocks of the Chuckwalla Mountains. The Coxcombs need only to be seen, with their bold, several-thousand-feet-high granite imitations of coxcombs, to be identified by the most careless observer, and the color of the Chocolate range distinguishes it the moment it is seen.

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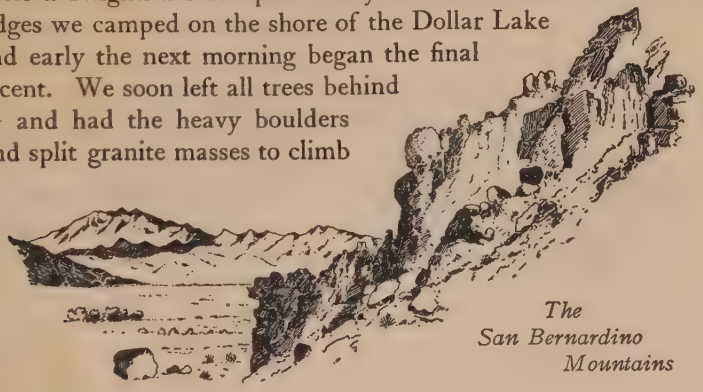
PALMS CLIMBING THE RIDGES ON THE COLORADO DESERT

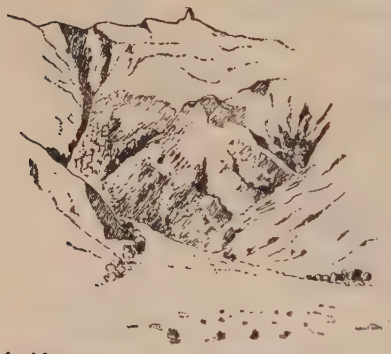
Several years ago I made the ascent of San Gorgonio. I have also made it recently. For convenience I will write of the two trips as one. In stage we traveled from Redlands into the heart of the Santa Ana Canyon, where, at a well-watered ranch, we changed to the burro train. For several miles the trail led up the canyon and over the slopes until the camp of Seven Oaks was reached at an elevation of five thousand feet, about twenty-two miles from Redlands. After a day or two of rest, riding over to the Great and Little Bear Valleys and seeing the great dam which impounds water for the thriving cities in the valleys below, a companion, A. H. Pratt, and I set out for San Gorgonio. After a delightful ride up the canyons and over the ridges we camped on the shore of the Dollar Lake and early the next morning began the final ascent. We soon left all trees behind us and had the heavy boulders and split granite masses to climb over. Pratt carried the camera and I a half-dozen eight by ten plates and the tripod. The altitude told somewhat on our breathing and the snowslides we had to climb added new difficulties. Step by step we forced our way along, now stopping to take breath, now lying down on the sloping snow or rugged rocks to rest. At last the flat summit was clearly outlined before us.



The San Bernardino Mountains

A few more gasps, a few more struggles and we were on top. I had purposely kept my eyes from looking out before I was fairly on the summit. I wished to see nothing until I could see *all*. In a moment the great vast scene was given to me. It was mine to enjoy, to wonder over, to study, and to feel its gigantic

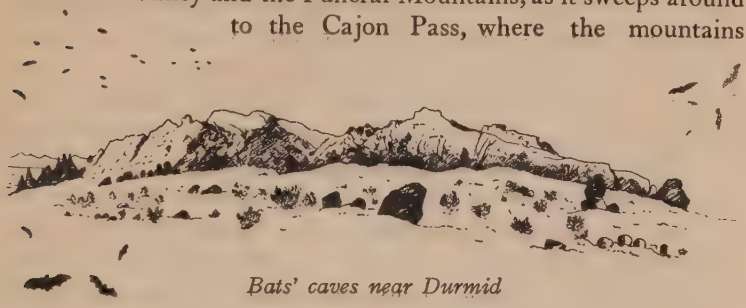
power. The first impression was that it was not, could not be real. It was so wonderful, so vast, so extensive, so diverse, and everything was so magnified — space, distances, sandy wastes, flat plain, water — that it seemed as if it was one of the opium or hasheesh dreams of De Quincey or Fitzhugh Ludlow. It was monstrous, enlarged beyond conception, terrific in its power. Then, too, it was so strange, so foreign. It was desert, yet at our feet was a great forest, leading down to an expansive plain of snow, beyond which nestled a vast lake. Yet how could it be snow, when heat waves were ascending from it? It was a delusion, a mockery, a phantasm. No! it was not snow. It was salty efflorescence and white or gray sand. The billowy yellowish green of the trees, the mixed greens and grays of the foothills, with their verdure and granite boulders, the gray stretch of sand from the pass to Indio, the oasis caused by the flowing wells reaching from Indio for twenty or more miles in the Coachella Valley, the sand-dunes to the left and right of Indio, the Salton Sea which lay like a turquoise mass of the sky prostrate upon the earth, the grays, chocolates, reds, and browns of the mountains on either side, gave a color picture as weird and startling as it was entrancing and bewildering. The sand-dunes from this elevation assumed all kinds of hideous and monstrous shapes, as if the pterodactyls, ichthyosauri, and terrific camels, dromedaries, sphynxes, whales, leviathans, wrecked vessels covered with sand and mossy green stuff that crowd a nightmare with terrors had suddenly become transfixed here forever. The entire scene is vividly pictured in memory.



A side gorge on San Jacinto Mountains

The Mohave as well as the Colorado Desert is stretched out before us, and every one of the small desert clusters of mountains can clearly be distinguished and named. To the south, nine

thousand feet below, yawns the San Gorgonio Pass, and on the other side we can see clearly what we never before were able to understand, viz., that San Jacinto on its desert side is the steepest mountain rise known in the world, ten thousand feet in less than five miles. Just around the corner there to the southwest is the entrance to Chino Canyon, where my desert camp is hidden. Far beyond the Salton is the Imperial Valley, the green making a delicious contrast to the fierce uprising heat from the desert in and around Yuha. Lower California, Arizona, and part of Nevada are clearly to be seen, the eye resting upon Death Valley and the Funeral Mountains, as it sweeps around to the Cajon Pass, where the mountains



Bats' caves near Durmid

at our feet, pine-clad and green in their beauty, drop down to a low level. Sweeping upwards again they form the two Cucamonga peaks, San Antonio and all the lesser peaks and ridges of the Sierra Madre, leading the eye along to the San Fernando Mountains, and the Sierra Nevadas to the east, while to the west are the Sierra Santa Inés and the great placid sweep of the Ocean of Calm.

In the immediate foreground, spread out like a vast Turkish rug, lined and streaked with avenues and roads, but woven into a pattern of such sublime grandeur and inconceivable intricacy, with colors so glorious and enchanting as if angels had conceived it for the very footprints of Deity Himself, is the fertile stretch of Riverside, San Bernardino, Orange, and Los Angeles Counties, where all the semitropical verdure, trees, plants, shrubs, and flowers are gathered together to surround the dwelling-places of men.

There are not many scenes that "dwell" in the mind of a constant traveler. One shuts out another. But though I have been "on the jump" for many years, studying and observing with care, yielding myself with unrestrained enthusiasm to all new scenes, this one stands out yet as vivid and clear as it did on that morning a dozen or more years ago.

The companion peak, San Bernardino, may be reached by a seven or eight mile climb along a rugged but wide ridge. Its view is somewhat similar though not as sweeping as that of San Gorgonio. Snow on this summit falls as deep as twenty and twenty-five feet, for in June I have found wide banks from ten to twelve feet deep. Here is the source of the water supply of the desert, and not only of the desert, but of the fertile region.

Quite recently George L. Lamy, an engineer of Riverside, reported that he had discovered an underground stream flowing from the slopes of San Gorgonio to the marshes at Long Beach. He claims to have mapped this underground flow, so that he can tap it at any point, and has just closed a contract with the city of Corona for five hundred inches of water, constant flow, at a price of half a million dollars. Thus these desert sentinels prove their utility as well as their majesty and beauty.

There are several ways that one may reach the summit of Mount San Jacinto, and they are all well worth attempting. The most popular is that by way of Strawberry Valley. This valley is now a noted resort and one gains its sheltering hotel without more trouble than a pleasant stage ride. The most picturesque trail is up Palm Canyon from Palm Springs, and this is described in the chapter "From Pines to Palms." The most difficult and least known is an old Indian trail from the hot spring in Chino Canyon, but the most diversified is that from the San Gorgonio Pass at La Cueva. There is no trail, save here and there the track of the mountain sheep. Leaving La Cueva, which is at the base of the mountain on its northern side, we enter Falls Creek Canyon, passing beautiful sycamores on the way. The canyon is wild and rugged; a spur of the mountains rising sharply on one side for several thousand feet, and a sheer wall, about fifteen hundred feet high, lining the other side. One may stand on the top of

this precipice wall and throw a pebble into the creek below. The slopes of the mountain are dotted here and there with a variety of cactus and the creosote bush, artemisia, and live-oak. Along the watercourses are alders, sycamores, and live-oaks with numberless vines, mosses, lichens, liverworts, and grasses. To gain the snow ridge one now has to climb and explore. Canyon after canyon, and ridge after ridge are crossed, where icy waters flow down from the snow-fields above. The only sure plan is to resolutely edge around to the northwest; keep persistently pushing around, overcoming the difficulties as they arise. To attempt to go to the summit directly from the north is surely to court defeat, as every canyon seems to terminate in a waterfall, and the ridges are densely covered with manzanita and a chaparral of scrub-oak, greasewood, and buck-brush. This tangled mass varies from five to twelve feet high, and is often impenetrable save with an axe. But the charm and delight of exploring these rugged canyons, enjoying the waterfalls and the clear, pellucid streams of snow-water, and the rare experience of walking into snow tunnels made by the flowing water, where, at a temperature near to freezing, one can look out to ridges upon which he baked at 100° Fahrenheit a few minutes before, make this rugged north slope of San Jacinto the most desirable point of attack to the real lover of mountain climbing.

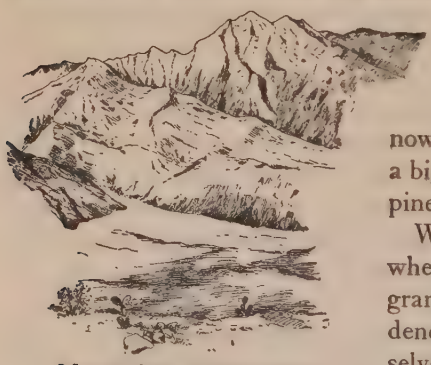
Following one of the ridges, the parallel canyon below full of deep snow, we may observe the processes at work which made in the long ago past the immense number of granite boulders found in the San Gorgonio Pass. Here are the remnants of true glaciers — weak and feeble, it is true, still actually and easily carrying masses of rock a ton and more in weight and tumbling them down into the creek below. All the creek beds are strewn with these glacier-hewn and glacier-transported boulders, and day after day one may witness the cracking or breaking off of the rock masses from the face of the cliffs.

When I think of the students in the schools and colleges in Southern California, — at Redlands, Riverside, Corona, San Bernardino, Pomona, Ontario, Pasadena, Los Angeles, Long Beach, etc., — none of them more than four hours by rail away from this point, and how they might in this grand school of Nature

learn something of her processes by actual contact, I wonder and ask myself when will the teacher of the superior (!) race learn from the Indian, and, instead of teaching his classes about glaciers and soil-making from books, bring them out into the places where these things are actually transpiring? A few days camping out here will teach lessons that ten years of books can never supply.

Higher up we come to the smoothed rock faces, where, centuries ago, the glaciers, larger than now, glided over these granite fields, shaping them into curves and domes, and grooving them with the rocks they carried along.

Remembering the tree growth on the eastern slope at the height we have now attained, here we find a somewhat different growth; there the single-leaved nut-pine being most in evidence, while here there are evergreen oaks, willows, sycamore, walnut, alder, and cottonwoods, with, now and then, a big-cone fir, a big-cone pine, and the yellow pine.



Mount San Jacinto from Whitewater

We now approach an area where there are few trees, the granite being mainly in evidence. Above this we find ourselves in the real forests where the tall timber grows. And what a change it is from the scorching desert beneath! Now and then, as we have ascended to prominent ridges, we have had wonderful outlooks, over the pass, across to the San Bernardino range, with its flashing snowfields and sparkling watercourses. We have been following the course of the railway trains from Banning down to the level of the desert floor; we can see the pulsing heat waves ascending as from an oven, and we remember our own discomfort in the heat but a day or two ago, and now! now! we are in the most delicious shade, surrounded by an atmosphere that fairly flows into every hidden place of our body, bringing cool refreshment and sensations of fresh vigor and new life. The pines sing joyously above

us, and, as we see the bare ledges of the granite above, capped by the snow-streaked summit, we cry Excelsior! and joyously dash on ahead. It is not a hard climb, nor is it dangerous. The slope is comparatively easy and, while there is dense though low undergrowth, the chief feature of which is the chinquapin, it occurs in patches which are easily avoided. In the heart of the pine forest there is no underbrush. Fires have swept it clean, but the floor is covered with a springing carpet of sweet-smelling spiculæ, and large cones which we wish we might carry off to sweeten the rooms in our house in town.

In the final climb of the last one thousand feet or so there are but few trees and when, at last, the summit is reached we feel — what? That we are well repaid? We have been repaid all the way up. Each hour's climbing has brought its own immediate reward. And the expansive view? We have stolen so many views on the way up that this adds but little to what we have already gained, except, of course, that we have a new series of views to the east, south, and west. But the chief charm to me of being on the summit is that I learn a new respect for the grand mountain itself. Everything below seems to fall into its proper place. Proportions are better understood. I know now what a truly majestic mountain I am standing upon, and henceforth it will be different. To gain this knowledge was well worth all the labor of the arduous climb.

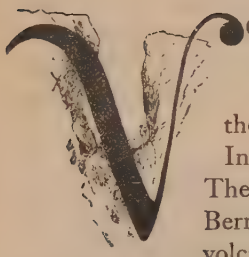
Mount Cuyamaca is about six thousand five hundred feet above sea-level, and is one of the offshoots of the great Sierra San Jacinto. It is the most prominent of the mountains on the desert side of all the San Diego County mountains. The highest point is known as Lyon's Peak and is a bold, gaunt mass of granite, in the winter months covered with snow. It is a comparatively easy mountain to ascend, though few make the trip, as the three peaks of the San Miguel range are nearer to San Diego, easier of access, and higher than Lyon's Peak. But the surpassing joy of this ascent is the view, which has a fuller and nearer combination of all the varied features of the land. Here there is the same wonderful combination of old and new, wild and tame, uncultivated and cultivated, found on the other summits, but with the addition of the close proximity of the ocean

on one side, and the Imperial Valley on the other. Both are clearly discernible, the former lying beneath the afternoon sun like a long golden cloud, and the latter, green almost to blackness, like a vast emerald in shadow.

From the summit of these mountains, especially those standing between the desert and the Pacific, one can well study some of the phenomena of the peculiar climatology of this region. I have elsewhere explained the wind blast through the San Gorgonio Pass, and the fact that the cooled air currents flowing from the ocean back eastward over the range are met by more ascending hot air columns from the desert. This conflict of the two opposing columns explains the comparative coolness and dryness of the atmosphere on the higher slopes of the San Jacinto range and that few cooling breezes flow over the mountains into the desert in the daytime. The action of these air currents can speedily be determined by watching an ascending column of smoke from a desert fire. As it rises it flows gently to the east, going more and more slowly, until, when at an elevation of 8,500 to 9,000 feet, it comes to a standstill, and then steals off to the west. On the summit of Mount San Gorgonio I well remember the feeling of surprise at discovering the wind blowing westward, while in the canyons several thousand feet below it invariably blows to the east.

CHAPTER VI

The Volcanoes of the Desert



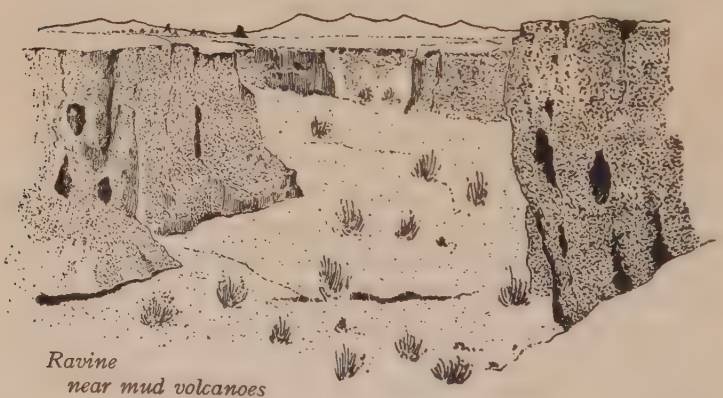
OLCANIC activity has made many changes in the Colorado Desert. Clarence King calls San Jacinto Mountain a volcanic peak, and the noises heard beneath it that so frighten the Indians suggest some kind of internal activity. The mountains of the continuation of the San Bernardino range below the Morongo Pass are volcanic, and the four buttes that are now islands at the southeastern end of the Salton Sea are of lava and pumice.

There are, however, in the limits to which I have confined myself, no extinct volcanic craters as on the Mohave, Painted, and other deserts of this southwestern region. Pilot Knob may be taken as an illustration of evidences of former volcanic activity, and yet there are volcanoes (or were, until a few months ago) active and alive, giving forth their messages from the heated interior of the earth. It is with these volcanoes I wish my readers to become acquainted. They are volcanoes, not of fiery lava, but of hot quicksands and mud.

Pilot Knob is a well-known landmark that has guided many a weary traveler over the desert ever since it has been traversed by the foot of intelligent man. It rises, solitary, from the Colorado River plain, a few miles southeast of Yuma. The Southern Pacific railway, as well as the river, passes close by it. Though mainly composed of granite, the bent and contorted mass, which is traversed by dikes of basalt or some dark variety of crystalline trap rock, shows so clearly the effect of volcanic action that I call attention to it here. The Knob itself is of a jet black color, and it glistens in the sun as if it had been varnished or highly polished.

Until the railway ran through the desert it is not to be wondered at that few knew anything of the mud volcanoes or *salses*. The

Indians of the country have always regarded them as the abode of evil and malignant spirits, and to the white man the fearful heat of the glaring sands and clays and alkaline beds of the desert, with the scarcity of water, and even that of a bitter and brackish quality, were sufficient obstacles to prevent his willingly risking his life to visit them. The coyote, that desert scavenger that likes liberally to thrust his nose into everything, shuns these salses. His experience has been that hot water, hotter mud, and poisonous fumes are not good for his nasal extremity, and the dried-up skin and bones of one fellow that I found on my first visit proved that one inquisitive nose had led its possessor to his death. On this first visit,



Ravine near mud volcanoes

too, I discovered how treacherous the ground was in which the volcanoes occur. I was cautiously walking toward one of the craters from which a bubbling sound arose, when to my horror the ground gave way beneath me and had I not been more than usually quick mentally and active physically in such cases I should have been precipitated into I know not what beneath. I only know that as I threw myself backward, flat upon the earth, I heard an unusual activity in the several near-by craters, as if some demoniac spirits were expressing their anger that I had escaped the trap they had laid for me.

And this was not all the work of imagination. When Professor Hanks, the State Geologist, visited this region some years ago, he

fell through in like manner, but unfortunately did not escape as I did. His body was immersed nearly up to the shoulders in scalding hot water and mud, and only by the superhuman efforts of himself and companion was he rescued. For a time it was thought he was fatally scalded, but good care and the healing power of the desert restored him to health.

After my experience I secured two long and broad strips of wood and fastened them to my feet as Norwegian snow-shoes, or skees, and then laboriously but safely went on with my investigations.

On the occasion of my visit, in March, 1906, the ground seemed to be much firmer and these precautions were unnecessary.

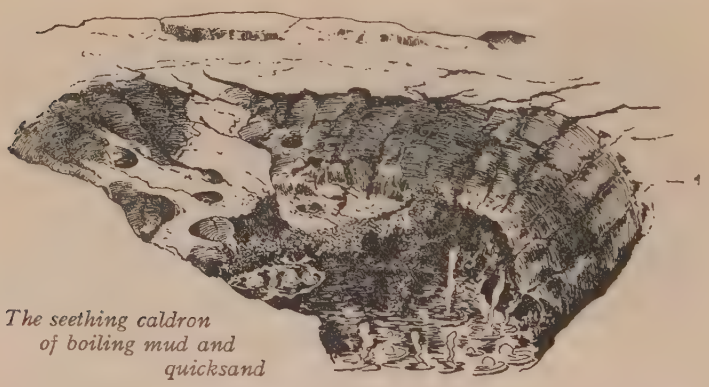
Approaching the mud volcanoes

These mud volcanoes were first made known to the world by Professor Blake in the report of explorations for a railroad to the Pacific, though they were visited by Major Heintzelman and Dr. J. L. Le Conte in 1850, while the former was stationed at Fort Yuma. There are two areas of them, one near Sierra Prieta and Volcano Lake in Lower California, and the other not far from Pelican Island, and now covered by the Salton Sea. I shall describe the latter only.

On approaching the salses one can hear the wild rush of the steam, the hollow sounds of the mud explosions and the peculiar murmur of the boiling caldrons of quicksand. The space occupied is about five hundred feet long and three hundred and fifty broad, slightly elevated above the clayey plain. We had to wade through a narrow and shallow pond of salt water to reach the

volcanoes. The smell of sulphur was quite strong, and the bubbling, soughing, hissing, venting, and spitting of the water, steam, and mud filled our ears. There were over a hundred vents of one kind or another, most of them so small as to be perfectly ridiculous. It seemed as if a lot of tiny devils were playing at making volcanoes: watery mud, scalding hot, bubbled and gurgled and frothed in the same way that artesian water bubbles over the top of its casing. Black, ill-smelling, and fearsome it was.

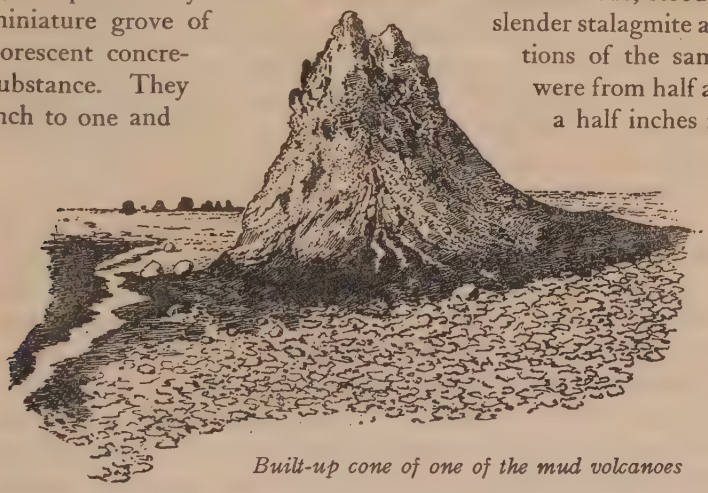
Here is Veatch's description, which in one or two particulars differs materially from what we saw: "The steam jets of the salse issue from conical mounds of mud varying from three to



The seething caldron of boiling mud and quicksand

fifteen feet in height, the sides presenting various angles, some being sharp and slender cones, others dome-shaped mounds that seem to have spread and flattened out with their own weight, upon the discontinuance of the action that formed them. Out of some of the cones the steam rushes in a continuous stream, with a roaring or whizzing sound, as the orifices vary in diameter or the jets differ in velocity. In others the action is intermittent, and each recurring rush of steam is accompanied by a discharge of a shower of hot mud, masses of which are thrown sometimes to the height of a hundred feet. These discharges take place every few minutes from some of the mounds, while others seem to have been quiet for weeks or months. During our short stay we had specimens of the rapidity with which a sharp, conical mound

could be built up and again tumbled down. In one place a stream of hot water was thrown up from fifteen to thirty feet, falling in a copious shower on every side, forming a circle within which one might stand without danger from the scalding drops, unless the wind chanced to drive them from their regular course. It issued from a superficial mound out of an opening about six inches in diameter; but the column of steam and water, immediately upon issuing, expanded to a much greater size. The orifice was lined with an incrustation of carbonate of lime, and around it, and particularly on the southeast side, stood a miniature grove of slender stalagmite arborescent concretions of the same substance. They were from half an inch to one and a half inches in



Built-up cone of one of the mud volcanoes

diameter, and from four to eight inches in height. Many of them were branched and the tips colored red, contrasting beautifully with the marble whiteness of the trunk, and resembling much a coral grove. Some were hollow, and delicate jets of steam issued from their summits, and this seemed to explain the mode of their formation. Some were not hollow throughout, being closed at the summit, but when detached from their base, a small orifice in the center suffered hot steam to pass, and some degree of caution was required to remove them without scalded fingers. To approach the spot was a feat of some difficulty, surrounded as it was by a magic circle of hot rain. I retreated, scalded, from the only attempt I dared make; but my son, more adventurous

or more attracted by the beauty of the specimens, succeeded in bringing away several. The falling water ran off into a pool a foot deep, but what became of it was not apparent, as it had no seeming outlet. I brought away a bottle of it for examination. It was transparent, but had an intensely bitter and saline taste. A little beyond, on either hand, are two huge caldron-like basins, sunk five or six feet below the general level, and near a hundred feet in diameter. Within these caldrons a bluish argillaceous paste is continually boiling with a dull murmur, emitting copious sulphurous vapors, and huge bubbles, bursting, throw masses of mud to the height of several feet. These kettles sometimes boil over, and the matter runs off in a slimy stream toward the Salt Lake. This seems to have been the case recently, as we encountered the track of one of these streams, not yet dry, a mile from the salse."

I have never seen the volcanoes in the high state of activity thus described by Dr. Veatch. There is every reason to assume that they have periods of greater and lesser activity. In March, 1906, there was no hot water being thrown up to a great height. The evidences of greater activity than we saw, however, were most abundant in several quiescent craters. The tininess of some of the vents was a source of amusement to me, for they were so small that my lead pencil effectively checked their spitting and fizzling. I thrust it down one of them as far as it would go, and when it was withdrawn the little crater, or cone, like a vicious cat, spat and hissed at me in a very funny manner.

When I circumnavigated the Salton Sea in June, the whole volcanic area was under water. Not a trace or sign of it remained save the four volcanic buttes, which are now islands.

I now await with great interest the "going down" of the Salton Sea, and the uncovering of the volcanoes. Will the water have quenched the internal fires? Have they been quieted forever? How will the ground be affected? These and other questions I hope to solve soon after the water subsides.

CHAPTER VII

Explorers and Pathfinders

HOW many centuries is it since the first man saw the desert? Who first gazed upon the wastes of the Colorado? What foot first trod the virgin sand after this new-made area was wrested from the Gulf of California? Was there any horror, any terror, any surprise, as its wonders were revealed for the first time? And what existed there then? Was there much difference compared with what we now see? How did it first appear?

Ah! these questionings of the human mind; these problems that are constantly arising before us and demanding solution; what a blessing they are to us; how they stimulate research and add to man's capacity and knowledge.

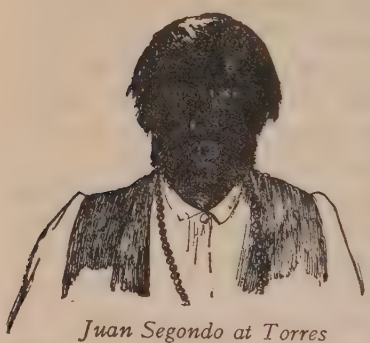
Birds, doubtless, first saw the Colorado Desert as it slowly assumed the form and appearance it now possesses. In calm indifference they soared the empyrean and floated across the waste, not perceiving, perhaps, that change was taking place. And yet the water-birds must have noted a change. Those that nested in the mountains or foot-hills near the San Gorgonio Pass, and "fished" in the silent waters as the pelicans and herons now fish in the Salton Sea, followed the retreating waters and, if they were capable of it, wondered at the close of each day to find their homeward flight so much the more prolonged.

Then the animals of the foot-hills, who had laved in and drank of the waters of the great inland sea; they walked to and fro each morning and night over the freshly emerged land. They were the first pathfinders. They made the first trails. Over the washed-down sands of the mountains, now and ever-henceforth-to-be desert sands; around the surface irregularities of the newly exposed area they stealthily moved, some fearful and timorous, some bold

and courageous, but all alike seeking the precious fluid which each day seemed to be going farther and farther away.

The grizzly, the mountain lion, the antelope, deer, bighorn, coyote, fox, gopher, rat, jack-rabbit, cottontail, — *these* first discovered the desert and explored its yet virgin wastes.

So that when man, dusky man, came on the scene, all he had to do was to follow the paths already made and he would find most of the places and objects that were by him desired. For, on the desert, the needs of primitive man are not very far removed from those of the lower animals. Food, drink, shelter for one's self and one's family, — these though insistent and imperative needs are not large needs: they are comparatively easily satisfied.



Juan Segondo at Torres

For long centuries our brown brother traversed the desert alone; unmolested and unafraid, save for fear of others of his kind who might need the small supply of water upon which he and his were relying. He dug the wells that now tell of his early wanderings and habitations; he found the quickest routes from diverse and divergent points; his unclad foot wrested from the reluctant soil the token of his journeys in the form of trails and paths; his eye witnessed the first growth of flowers, cactus, and trees. He was the first to realize how vast the difference between the desert covered with flowers after the rains, and the desert of the hot scorching months. He first felt the fierce and withering blasts blowing down the San Gorgonio Pass, and saw the piling up of the moving sand-dunes. His eyes first gazed upon the spitting and fuming, the bubbling and soughing of the sand and mud volcanoes, and he first saw the deposits of salt and the millions of shells that now arrest the gaze of the white visitant.

Then came the explorer of the white skin; the man with lust in his eye, — lust for gold, new territory, achievement, conquest. By 1522 Cortés had subjugated the continent from the isthmus of

Tehuantepec to Pánuco and Colima. Forces were sent south into Guatemala, while Cortés dreamed of further explorations and discoveries north. The activity of his enemies sent two powerful foes to harass and circumvent him. One of these, Nuño de Guzman, was to have a large share in shaping events which led to the discovery of the Colorado Desert region to the Spaniard, for in person he went northward and discovered and subjugated much new territory. Then came the Viceroy Mendoza. Cabeza de Vaca had made his memorable trip across the continent. Marcos de Niza was sent on his reconnaissance which led to the discovery of Arizona and New Mexico, and then Cortés and Mendoza engaged in a strenuous political fight as to who should explore the northwest region further. Cortés claimed the exclusive right, and Mendoza naturally wanted some share in such interesting proceedings which were liable to bring honor, fame, and wealth to their successful prosecutor. Cortés succeeded in making the first start. He sent Francisco de Ulloa, with three vessels, up the coast from Acapulco, July 8, 1539. This was the expedition that discovered that there was a gulf,—now known as the Gulf of California,—but Ulloa, on reaching the head, made no attempt to explore it, contenting himself with noting that the low sandy shores, about a league off, united. Had he sent a boat to that "point of uniting" he would have discovered the Colorado River, which there enters the gulf.

It was now Mendoza's turn. Coronado was sent overland on that great march of his to New Mexico, and Pedro de Alarçon was made head of a maritime expedition which was to co-operate. Though Ulloa had discovered no river at the head of the Gulf of California, there seemed to be a general idea prevalent that there was such a river, for Alarçon's instructions implied that he was to sail up it, and keep in touch with Coronado as he journeyed to the regions described by Marcos de Niza.

It was in May of 1540 that Alarçon sailed, with two vessels. At Culiacan he found a third vessel which had been sent on ahead with supplies. These three vessels then proceeded northward, and when he reached the spot where Ulloa had turned back he combated the wishes of those of his own company who were desirous of returning by sending out two pilots. These men found the

passage up which, with great difficulty and narrow escapes from grounding, the vessels passed, finally coming to anchor at the mouth of a great river, the current of which was so rapid that they could scarce stem it. Here Alarçon left his vessels, and taking two shallops, manned by twenty men and two officers, he pushed his way up the river for nearly sixteen days. The Indians at first were troublesome, but soon became more friendly and solicited Alarçon to remain and become their chief. There is no definite data by which we can determine exactly how high up the Colorado River Alarçon went. He did not find any news of Coronado, however, and so returned, making the downward journey in two days and a half, owing to the swift current. A little later he ascended the river again to a point beyond where the river flowed between high mountains, and, according to his own statement, eighty-five leagues from the head of the gulf. It is likely, however, that the doughty Spaniard measured the leagues by his feeling of weariness as his boats were towed up the sinuous and tortuous channel of the Colorado. Scores of miles are lost daily in this manner. The banks are winding to a degree seldom found, and the river itself runs its tortuous course, first on one side, then on the other, crossing and recrossing until one can no longer keep count of the times. So it is not to be wondered at that when Melchior Diaz came by land to the spot where Alarçon had left letters at the foot of a large cross, he estimated the distance as fifteen leagues from the mouth. There is great discrepancy between eighty-five and fifteen, hence we are left to conjecture as to whether Alarçon ever gazed upon that portion of the Colorado Desert now within the confines of the United States. General J. H. Simpson, however, believes that he passed several miles beyond the junction of the Gila with the Colorado, although it seems reasonable to expect that had he done so he would have made some note of so important a fact.

That Diaz and his party walked on the Colorado Desert is pretty well assured, and to them the honor of being the first white men to explore the region must be accorded. For, after reading Alarçon's letters, Diaz followed the course of the river upward for five or six days, and then concluded to cross it by means of rafts. The Indians of the region — the Cumanas — had not been hospitable,

by any means, and one of their medicine-men had endeavored to stop Alarçon from proceeding farther up the river by placing magic reeds on the bank. These Indians were undoubtedly the Yumas. Substitute "Y" for "C" in the name "Cumanas" and the Spanish form of spelling the tribal name is apparent. To this day the Yumas are hostile. The white man is an intruder. They want to live alone, unmolested, undisturbed.

Their craft and cunning in dealing with Diaz were what one now familiar with them might expect. They readily responded to his request to help make the needful rafts and assist his soldiers in crossing the river. What a chance was here! Get the hated intruders separated, some on one bank, some on the other, and still others on the rafts in the act of crossing, and then attack them. Strategy indeed, not unworthy of soldiers of greater pretensions than our Yumas. But Diaz was one too many for them. Danger had taught him to meet craft with craft, cunning with cunning. One of his soldiers reported suspicious circumstances; one of the Indians was arrested, put under torture and soon the whole plot was revealed. Open hostilities were now engaged in, and only by the use of his superior weapons was Diaz able to drive the Yumas away to the mountains. Then, free from interruption, he and his party crossed the river to the California side and the Colorado Desert felt the tread of its first white explorer. For four days Diaz wandered on the desert. It was a hard trip. The sands were like hot ashes, he reports; the earth trembled, and the whole country was desolate and forbidding. No wonder four days of it satisfied him. He fled from its scorching weariness and it saw him again no more.

In 1604 Juan de Oñate, the reconqueror and governor of New Mexico, marched from San Juan de los Caballeros (a small town near where Santa Fé now stands) to the west, with the intention of discovering a new portion of the Mar del Sur (South Sea, or what we now know as the Pacific Ocean). From this journey he hoped to gain fame and wealth. The conquests of Cortés and others inflamed the minds of the earlier explorers, and the country was pretty well known before hope was abandoned of startling results from each enterprise. Oñate crossed New Mexico and left his autograph chiseled in stone upon the interesting rock known as

"El Morro." He reached the Colorado River by the Bill Williams fork and had various adventures with the Mohaves, and on the twenty-third of January, 1605, reached tide-water. He christened the port "San Pablo" and then returned to New Mexico. It must have been on his return trip that he stopped at El Morro, for he reached San Juan on the twenty-fifth of April, and the date of the inscription is April 16, though the latter says 1606 while the records give it 1605.

From this time on we know of no white man visiting the desert until after the missions in Alta California were established. The peninsula of California was discovered, Jesuit missions were founded and conducted for seventy years, and then came the movement for the colonization and missionizing of Alta California which I have fully treated in my "In and Out of the old Missions of California." After the Franciscans had established some of their missions in Alta California it was found to be too long a journey to reach them only by way of the gulf and up the peninsula. The missionaries in Northern Sonora had made several *entradas* toward the Colorado River, and one of them, Francisco Garcés, the most indefatigable of all, save the Jesuit Padre Kino, in 1771, came from San Xavier del Bac, near Tucson, crossed the Colorado and made some confused wanderings on the desert of which it is impossible to give any connected account.

Pounding mesquite beans

It must be remembered that at this time there were no white men in Arizona except at the few missions among the Pimas and the Hopi, and none in California save at the five missions already established. The whole region across Arizona and California, until the San Gorgonio Pass was reached, was one of horror and desolation even to these experienced travelers.

The first Christian to make the whole trip across the desert from San Gabriel to the presidio of Tubac (forty miles south of

the present Tucson, Arizona) was an Indian, Sebastian by name, who had fled from the mission with his parents and wife. He had wandered far to the east to avoid meeting soldiers who would return him as a deserter. His family all perished, either by hostile Indians or the hardships they had to endure, but there is no doubt but that Sebastian crossed the San Gorgonio Pass and traversed the desert to Yuma, where he was taken by the natives to the Pima and Papago country and came in contact with Captain Juan Bautista de Anza. This gallant officer was the commandant of the presidio of Tubac, and he had long expressed his desire to participate in the colonization of California.

The Viceroy Bucareli at length granted him a license to explore the country from Tubac to the California missions to see if a feasible route could be made of it for subsequent travelers to and from the missions, and on the eighth day of January, 1774, with Sebastian as a guide, and Padres Font and Garcés as spiritual advisers, the desert caravan started. There were thirty-four men in addition, with one hundred and forty horses and sixty-five cattle. On reaching the Colorado River, Anza made friends with Palma, a well-known Yuma chief, who accompanied the party across the river as far as a lagoon to the southwest which was formed by the Colorado in time of flood. Then for six days Anza wandered through a country so destitute of grass and water that he was compelled to return to the lagoon, and beg the assistance of Palma. Where he wandered during these six days it is impossible to tell, but supposing the lagoon to the southwest of Yuma to be below the Mexican line it is very probable that it was in what we know as the Imperial Valley. Palma now directed Anza which way to go, and the Indian followed after with the baggage, horses, and cattle. Thus guided Don Juan had little trouble in going from water-hole to water-hole over the sand-hills, and into the Salton Sink north until the San Gorgonio Pass was reached, which they called "Puerto de San Carlos." Thence over the Santa Ana River to San Gabriel the rest of the journey was comparatively uneventful and easy.

While Anza went on to Monterey, he sent Padre Garcés back, over the desert, to the Colorado River, there to await his return.

Garcés made the journey in twelve and a half days,—not bad traveling for April weather.

Anza was not long behind, for he spent three days only at Monterey and then started back taking Garcés' track at San Gabriel. How those old-day rollickers lived on horseback! Here is a leader of an expedition who has just made the terrific journey of a thousand miles over an untried desert from below Tucson, Arizona, not in a Pullman or a comfortable Southern Pacific chair car, but on horseback, carrying all his supplies with him, starting back three days after his arrival. Surely there is a vast difference between the endurance of the men of the present day, who would no more think of riding a horse a thousand miles than they would of walking that distance, and the old Spanish soldiers who regarded such trips as a part of their everyday life.

And this journey, successfully completed, was but preliminary to a second one taken over the same country in 1775, when, with 240 persons, and over a thousand horses, mules, and sheep, he journeyed from Tubac to San Francisco. He it was who located the site of the presidio and mission in the City of Destiny by the Golden Gate. That was a wonderful trip over the desert, and it required no little courage, leadership, and knowledge to get such a party safely over the sandy wastes. It was mid-winter, the cold was intense, for, strange to say, they were met day after day with storms of snow, hail, and rain. And when it is cold on the desert the thinned blood feels it more; and we are not surprised at the record in the commandant's diary that his people suffered cruelly. There was considerable sickness but no fatality. About a hundred head of stock were lost, as water was so scarce that the fevered animals could not be restrained from breaking away in search of it. The party often had to be divided so that all should not reach the water-holes, with their poor and scant supply, at the same time. Wells were dug in many places. The scarcity of feed for the animals was another source of great discomfort. There were a number of women in the party, twenty-nine of them being soldiers' wives, and on the journey eight infants were born. The route taken was about the same as before, across the Colorado River at Yuma, over the Salton Basin and through the Mesquite

country to the San Gorgonio Pass, and thence to San Gabriel and Monterey.

From this time on this route was often followed, though in 1781 it was brought into sad repute by the horrible massacre of the Spaniards at Yuma. In 1780, Garcés had succeeded in establishing two mission pueblos there, but the influence of the friendly Palma was not sufficient to curb the spirit of hostility the Yumas had always felt at the presence of the strangers. In June, 1781, Rivera, who had held the offices of governor of both Lower and Upper California, arrived at Yuma with a band of colonists bound for Los Angeles and the Santa Barbara region. He crossed the Colorado, dispatched his party over the desert and then encamped on the eastern bank, with eleven or twelve men. On Tuesday, July 17, the Indians fell upon the white settlers at the two pueblo missions and also upon Rivera and his soldiers and succeeded in massacring forty-six of them, the ex-governor among the number.

Padre Garcés at his camp-fire

Ensign Limon, who had escorted the settlers to San Gabriel, was the one to discover the dreadful facts from the California side. He was returning with his nine men, when some of the desert natives informed him of the terrible outbreak. Leaving two men in charge of his animals he rushed ahead, using great care, however, in order to reconnoiter. Blackened ruins of buildings, dead bodies lying around in the plaza, and a fierce attack upon himself in which he and his son were wounded, were forceful corroboration of the hideous stories. Hastily he started to return to San Gabriel, only to find the two men left with the animals killed. Terror-stricken the wounded man made his weary way back over the

desert to San Gabriel, where the news was received with consternation.

It was determined to punish the Yumas, and two forces were sent out at different times, one from Sonora, and the other from the California side, but it was a poor-spirited campaign and next to nothing was accomplished. Suffice it to say the ringleaders were never caught or punished and the general effect of both efforts was to confirm the Indians in their hostility without inculcating in them any fear of the Spanish power. Hence in future the route over the Colorado to Sonora was regarded with great disfavor, though we have record of its being occasionally used.

In 1782, Don Pedro Fages, afterward governor, made the first trip ever recorded from the Colorado River to San Diego; a weary and arduous journey as all who have taken it since can testify. In 1783 an ensign tried to follow this route and see if it could be made practicable for constant use, but he came no farther than the mountains overlooking the desert and then returned. For several years desultory explorations took place from San Diego, but the route was too arduous to lead to its adoption and few ever used it until the coming of the United States Army of the West under Kearney in 1847, after which it became the Southern route for the gold seekers.

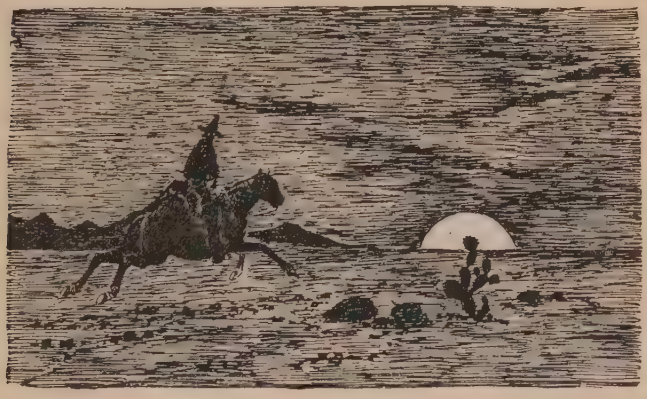
One of the desert's notable pathfinders was Jonathan Trumbull Warner (commonly known as Juan José Warner), from whom Warner's Ranch obtained its name. Born in Lyme, Connecticut, in 1807, ill health at the age of twenty-three forced him to seek a milder climate. He fell into that great current of humanity that was sweeping westward and the end of the year found him in St. Louis. The following year he formed an expedition to Santa Fé, and soon after his arrival there struck out, with eleven men, under the leadership of Jackson, Waldo, and Young for California. He crossed the Colorado River below the Gila, and then in November struck across the desert to San Diego via San Luis Rey, which he duly reached. After merchandizing in Los Angeles and engaging in other ventures, he was granted the ranch that bears his name, having been naturalized as a Mexican citizen, and in 1844 he moved there with his family, living there for thirteen years until driven off by an uprising of the Indians.

Photo. by C. C. Pierce & Co., Los Angeles, Cal.

PALMS IN THE OPEN, COLORADO DESERT

In November, 1831, Dr. Thomas Coulter, an English scientist, visited California, and made a trip from Monterey via San Gabriel to the Colorado River and back. He rode over the San Felipe Pass and crossed the desert by the southern route. His map shows that he went by the way of Pala.

Perhaps one of the most sensational and talked-about rides over the desert was that made in 1834, by a special courier, said to have been Rafael Amador, who rode from the City of Mexico to Monterey in forty-eight days (some say forty days). Think of that lonely trip, constantly beset by dangers from hostile Indians and never free from the dread of death by starvation, thirst, and



Rafael Amador's ride

losing his way. It was July when he started, and August is always a terribly hot month. The Yumas caught him and threatened his life, only releasing him after stripping him of all his equipment and most of his clothing, besides stealing his horse. He crossed the Colorado Desert at that scorching time on foot, and for three days was without water. He took the hardest route and struck out over the mountains to the south and finally reached San Luis Rey almost dead with fatigue and the hardships he had undergone.

It should be stated that he was bearing a dispatch from the Mexican dictator, Santa Anna, to Governor Figueroa, rescinding prior instructions which had been issued requiring the governor

to hand over his office to Don José Maria Hijar. Whether his mission was suspected or not I cannot say, but it is claimed that a friend of Hijar's ambushed and captured the courier and then urged Hijar to hurry to Monterey and seize the governorship before the message could prevent. But Hijar refused, and the courier was released and allowed to proceed on his way. His reward for the great trip is said to have been three thousand dollars.

It was in 1826 that the first trapper of the United States entered the Colorado Desert. Jedediah Smith was an adventurous spirit who, with fifteen companions, left Utah, near the Great Salt Lake, and wandered down the Gila to the Colorado. He crossed the river where the Mohaves dwell and was greatly impressed by their kind hospitality. Not only did they supply the party with fresh provisions, but they gave them horses which they had stolen from the Spaniards, and then supplied them with guides to direct their way over the desert to the mission of San Gabriel. There is no doubt that their route took them to the northern extremity of what is now Riverside County, as they entered the San Gabriel Valley over El Cajon Pass, near San Bernardino.

Though not on this trip with Jedediah, Thomas L. Smith, generally known as "Pegleg" Smith, was one of his later companions, who had many wild adven ures, some of them inseparably connecting his name with the Colorado Desert as is recorded in another chapter.

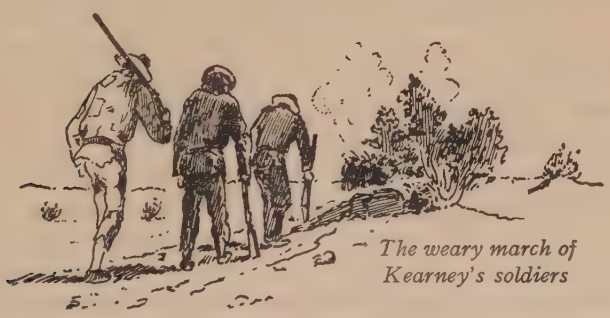
There is no doubt that several trappers and hunters crossed the Colorado Desert between the time of Smith's explorations and the coming of Kearney's Army of the West.

When the general reached the Colorado in November, 1846, he intercepted a party of Mexicans going from California to Sonora with five hundred horses to strengthen General Castro's forces. On one of these men were found dispatches telling of the revolt against the American occupancy of California, and this hastened Kearney's actions. He pushed on across the desert to Carrizo Creek, through the San Felipe Pass, only to meet with disaster and temporary defeat from the forces of Andreas Pico at San Pasqual. Colonel W. H. Emory's description of the desert journey is too interesting and valuable to lose, so I here quote largely from it.

"After crossing, we ascended the river three-quarters of a mile, where we encountered an immense sand drift, and from that point until we halted the great highway between Sonora and California lies along the foot of this drift, which is continually but slowly encroaching down the valley.

"We halted at a dry arroyo, a few feet to the left of the road leading into the Colorado, where there was a hole five or six feet deep, which by deepening furnished sufficient water for the men. We tied our animals to the mesquite trees, *Prosopis glandulosa*, and remarking on the way that they showed an inclination to eat the bean of this plant, we sent the men to collect them; the few gathered were eaten with avidity.

"November 26. — The dawn of day found every man on



The weary march of Kearney's soldiers

horseback, and a bunch of grass from the Colorado tied behind him on the cantle of the saddle. After getting well under way, the keen air at 26° Fahrenheit made it most comfortable to walk. We traveled four miles along the sand butte in the same direction as yesterday. We mounted the buttes and found, after a short distance, a firmer footing covered with fragments of lava, rounded by water, and many agates. We were now fairly on the desert. . . .

"After traveling twenty-four miles we reached the Alamo or Cottonwood. Notwithstanding the name there was no cottonwood here, but Francisco said it was doubtless the place, the tree having probably been covered by the encroachment of the sand, which here terminates in a bluff forty feet high, making the arc of a great circle convexing to the north.

"Descending this bluff, we found in what had been the channel of a stream, now overgrown with a few ill-conditioned mesquite, a large hole where persons had evidently dug for water. It was necessary to halt to rest our animals, and the time was occupied in deepening this hole, which after a long struggle showed signs of water. An old champagne basket, used by one of the officers as a pannier, was lowered in the hole to prevent the crumbling of the sand. After many efforts to keep out the caving sand, a basketwork of willow twigs effected the object, and much to the joy of all the basket, which was now fifteen or twenty feet below the surface, filled with water. The order was now given for each mess to draw a camp-kettle of water, and Captain Turner was placed in charge of the spring to see fair distribution.

"When the messes were supplied the firmness of the banks gave hopes that the animals might be watered, and each party was notified to have their animals in waiting; the important business of watering them commenced, upon the success of which depended the possibility of their advancing with us a foot farther.

"Two buckets for each animal were allowed. At 10 A.M., when my turn came, Captain Moore had succeeded, by great exertions, in opening another well, and the one already opened began to flow more freely, in consequence of which we could afford to give each animal as much as he could drink. The poor brutes, none of which had tasted water in forty-eight hours, and some not for the last sixty, clustered round the well and scrambled for precedence.

"At 12 o'clock I had watered all my animals, thirty-seven in number, and turned over the well to Captain Moore. The animals still had an aching void to fill, and all night was heard the munching of sticks, and their piteous cries for more congenial food.

"November 27 and 28. — To-day we started a few minutes after sunrise. Our course was a winding one, to avoid the sand-drifts. The Mexicans had informed us that the water of the salt lake, some thirty or forty miles distant, was too salt to use, but other information led us to think the intelligence was wrong. We accordingly tried to reach it; about 3 P.M. we disengaged ourselves from the sand and went due (magnetic) west, over an

immense level of clay detritus, hard and smooth as a bowling green.

"The desert was almost destitute of vegetation, now and then an *ephedra*, *œnothera*, or bunches of *aristida* were seen, and occasionally the level was covered with a growth of *obione canescens* and a low bush with small oval plaited leaves, unknown.

"The heavy sand had proved too much for many horses and some mules, and all the efforts of their drivers could bring them no farther than the middle of this dreary desert. About eight o'clock, as we approached the lake, the stench of dead animals confirmed the reports of the Mexicans and put to flight all hopes of our being able to use the water.

"The basin of the lake, as well as I could judge at night, is about three-quarters of a mile long and half a mile wide. The water had receded to a pool, diminished to one-half its size, and the approach to it was through a thick soapy quagmire. It was wholly unfit for man or brute, and we studiously kept the latter from it, thinking that the use of it would but aggravate their thirst.

"One or two of the men came in late and rushing to the lake threw themselves down, and took many swallows before discovering their mistake; but the effect was not injurious except that it increased their thirst.

"A few mesquite trees and a chenopodiaceous shrub bordered the lake, and on these our mules munched till they had sufficiently refreshed themselves, when the call to saddle was sounded and we groped silently our way in the dark. The stoutest animals now began to stagger, and when day dawned scarcely a man was seen mounted.

"With the sun rose a heavy fog from the southwest, no doubt from the gulf, and sweeping toward us, enveloped us for two or three hours, wetting our blankets and giving relief to the animals. Before it had dispersed we came to a patch of sunburned grass.

"When the fog had entirely dispersed we found ourselves entering a gap in the mountains, which had been before us for four days. The plain was crossed but we had not found water. The first valley we reached was dry, and it was not till 12 o'clock M. that we struck Carrizo (cane) Creek, within half a mile of one of its

sources, and although so close to the source, the sands had already absorbed much of its water, and left but little running. A mile or two below, the creek entirely disappeared.

"We halted, having made fifty-four miles in the two days, at the source, a magnificent spring, twenty or thirty feet in diameter, highly impregnated with sulphur, and medicinal in its properties. No vessel could be procured to bring home some of the water for analysis, but I scraped a handful of the salt which had effloresced to the surface of the adjacent ground, and Professor Frazer finds it to contain sulphate of lime, magnesia, and chloride of sodium.

"The spring consisted of a series of smaller springs or veins, varying in temperature from 68° to 75°. This variation, however, may have been owing to the different exposures of the fountains in which the thermometer was immersed. The growth was cane, rush, and a coarse grass, such as is found on the marshes near the seashore.

"The desert over which we had passed, ninety miles from water to water, is an immense triangular plain, bounded on one side by the Colorado, on the west by the Cordilleras of California, the coast chain of mountains which now encircles us, extending from the Sacramento River to the southern extremity of Lower California, and on the northeast by a chain of mountains, a continuation of the same spur noted on the 22d as running southeast and northwest. It is chiefly covered with floating sand, the surface of which, in various places, is white with diminutive *spinelas*, and everywhere over the whole surface is found the large and soft mussel shell.

"I have noted the only two patches of grass found during the 'jornada.' There were scattered, at wide intervals, the *palafoxia linearis*, *atriplex*, *encelia farinosa*, *daleas*, *euphorbias*, and a *simsia* described by Dr. Torrey as a new species without rays.

"The southern termination of this desert is bounded by the Tecaté chain of mountains and the Colorado; but its northern and eastern boundaries are undefined, and I should suppose from the accounts of trappers, and others, who have attempted the passage from California to the Gila by a more northern route, that it extends many days' travel beyond the chain of barren mountains which bound the horizon in that direction.

"The portal to the mountains through which we passed was formed by immense buttes of yellow clay and sand with large flakes of mica, and seams of gypsum. Nothing could be more forlorn and desolate in appearance. The gypsum had given some consistency to the sand buttes which were washed into fantastic figures. One ridge formed apparently a complete circle, giving it the appearance of a crater; and although some miles to the left I should have gone to visit it, supposing it to be a crater, but my mule was sinking with thirst, and water was yet at some distance. Many animals were left on the road to die of thirst and hunger in spite of the generous efforts of the men to bring them to the spring. More than one was brought up by one man tugging at the halter and another pushing up the brute by placing his shoulder against its buttocks."

But though they had entered the pass their difficulties were by no means over. Grass was luxuriant at places but very salt, the water strongly resembled that at the head of Carrizo Creek, and the earth, which was very tremulous for many acres above the pools, was covered with salt. The sharp thorns terminating every leaf of the century plant, *Agava Americana*, gave great distress to the dismounted and wearied men, whose legs were now almost bare.

The middle of the day was intensely hot and the poor horses and mules gave out by the score. Though only sixteen miles were traveled one day, many did not arrive at camp until ten o'clock. The wolves or coyotes followed them in droves and made sleep impossible as they battled over the carcasses of the abandoned animals. Horse and mule meat were their chief article of food, save what they could swallow of the leaves of the cactus.

It was on the first of December that they descended to the deserted Indian village of San Felipe. The mountains on either side, supposed to be from three thousand to five thousand feet high, were incrusted on the top with snow and icicles, and they encamped in a grassy valley watered by a warm stream which drained through a canyon to the north abreast of the village. From here through Warner's Ranch to Agua Caliente their journey does not particularly concern us, though it was a tragical ending to their nearly two

thousand miles of weary traveling that, at San Pasqual, eighteen of them, officers and men, were killed, and thirteen wounded by the onslaughts of the Californians.

This party was soon afterward followed by another whose trip was even more arduous, as it was encumbered with a wagon train. When General Kearney (then Colonel) started from Fort Leavenworth for New Mexico and California he succeeded in having two troops of dragoons attached to his command. The captain of one of these was P. St. George Cooke. At the same time an officer was sent to organize a battalion of five hundred men from the Mormons who had just been expelled from Nauvoo, Illinois, which was to follow to Santa Fé. On its arrival at Santa Fé Lieutenant-Colonel Cooke was appointed to its command and ordered to follow General Kearney *with a wagon train*, making its own road to San Diego.

It was a frightful trip to undertake: eleven hundred miles, the major part of which was through an unknown wilderness without road or trail. Many of the soldiers of the battalion were too old, too young or feeble; it was undisciplined; it was already worn out, for it had marched, on foot, from Nauvoo, Illinois, to Santa Fé; clothing was scant; there was no money to pay them and no stores from which clothing could be issued.

When the Gila was reached, sixty miles above the Colorado, Colonel Cooke sought to lighten the rest of the journey by constructing a raft and allowing the wagons and men to float down. His experiment was most unfortunate, as it proved to be a signal failure, owing to the shallowness of the water on the sand-bars. The difficulties in taking the wagons across the Colorado almost overcame both men and mules, and it was a weary and sorry-looking outfit that began the trip across the hardest portion of the desert. When Carrizo Creek was reached some of the poor animals had been without water for fifty hours. Men and beasts were almost exhausted, and could travel only a few miles a day, and to use an Hibernianism, those had to be traveled at night. Then came a great shock. After they had ascended three miles of the San Felipe divide with great labor the canyon was found to be so narrow that they could not get their wagons through. The advance guard, the pioneers, and guides were unable to proceed

and one of them coolly remarked, "I believe we are at a standstill." I can well imagine the feeling of desperation that came over the colonel as he saw those men standing there, idly waiting for him to come up, instead of doing something. Snatching up the nearest axe he began to hew away at the rocky sides, doubtless reinforcing his actions with emphatic words. His example was contagious. Axes and hammers were brought — all the road tools had been lost in the unfortunate experiment at pontooning on the Gila River — and soon the solid rock was broken into enough to allow of the carrying through of the wagon bed, tilted on one side, followed by wheels, also tilted. The last two wagons only were taken through by the mules with their loads undisturbed.

The San Felipe Pass

On reaching San Felipe news was received that led Cooke to change his route and aim for Los Angeles instead of San Diego. It would be interesting to follow his tracks, but space forbids. He was thus kept for several days longer in the mountain region belonging to the Colorado Desert and had some experiences with the Indians.

Possibly the next memorable ride over the Colorado Desert was that made by Kit Carson in March, 1847, with Lieutenant Beale to Washington with dispatches. He had been on his way East on a similar message from John C. Fremont when he met Kearney and his army, and it was on the command of Kearney that he had allowed his companion to proceed with the dispatches while he returned as guide to the Army of the West. He and Beale had stealthily found a way through the sentinels of the Californians after the battle of San Pasqual and had conveyed the news of the sad defeat to the officers at San Diego. Hence Carson and Beale were both well equipped to make such a journey, and their mutual confidence made their association helpful and pleasant. Yet it should not be forgotten that Beale was at that time suffering from

a dangerous wound. He was so weak that for twenty days Carson had to lift him on and off his riding animal. It was not thought he could live, but when this first and most dangerous part of the journey was ended he had so far recovered as to be able to take care of himself. It was this Lieutenant Beale who was instrumental in having camels brought into the desert.

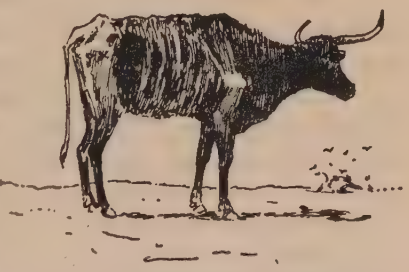
The Mexican War resulted in the seizing and holding of California and New Mexico by the United States and the purchase of Arizona. By the terms of the treaties both of Guadaloupe Hidalgo and the Gadsden purchase it was required that a boundary line should be jointly explored and run, and in 1850–53 John Russell Bartlett, with a competent corps of scientific assistants, performed that work for the United States. His chapter (XXVI) descriptive of the trip from San Diego to Alamo Mocho is most interesting. Before I proceed to give extracts, however, let me call attention to a mistake often made, even to-day, in this last name. It should be, properly, Alamo *Mocho*, not Mucho. Mocho means lopped or cropped, hence Alamo Mocho is the "Cottonwood with lopped branches." Alamo Mucho is "Many Cottonwoods." The well located here received its name from an old cottonwood, the branches of which had fallen or had been cut off for fire-wood.

Of the journey as far as San Felipe we have nothing now to do. The whole party embraced six wagons, twenty-five pack-mules, and about fifty officers and men, mounted. It was June 4, late in the afternoon, when they reached the San Felipe Pass where Cooke had hammered and cut his way through the solid rock. Now let Bartlett tell the story: "This defile consists of perpendicular walls of rock about fifteen feet high, and of a width barely sufficient for wagons to pass. In its bed are large masses of rock reaching to the axletrees. At the narrowest point one of the wagons stuck fast: but after taking out the mules, by dint of lifting and prying, we at length got through. The space here was but two inches wider than the axletrees of the wagons. There were also several steep and rocky descents where the wheels had to be locked and the wagons held back with ropes. This pass was not less than three miles in length; and should two trains meet here, it would prove a serious business for both.

"The descent into the valley beyond continued gradual for

several miles, but at length our course was stopped by a bold rocky hill running directly across it. This we ascended, over a very bad road; but bad as it was it was better than the descent, which was the most perfect breakneck place that a wagon ever attempted to pass. It was exceedingly steep, filled with large loose rocks, with an occasional perpendicular leap of three or four feet. I feared that our wagons would not hold together even if they escaped being upset. But the only accident that happened was the breaking of the two remaining barometers, a very serious one for the meteorological observations.

"At the bottom of this hill we continued for five or six miles through a valley, with no other vegetation than the usual desert plants and cacti, accompanied by the great *agave* which seemed to luxuriate in this barrenness. At eleven o'clock P.M. we reached Vallecita, eighteen miles from San Felipe, where we pitched our tents among the willows.



A desert-worn animal

"June 3.—Vallecita, as its name indicates, is a little valley, surrounded by lofty and barren mountains. Pools of sulphurous water are found among the willow bushes, but not a tree was to be seen. The grass, too, had changed, having here a wiry character. A depot of provisions is kept at this place, with a file of soldiers, for the supply of Fort Yuma, and of government trains passing and repassing. A few horses are also kept here, to facilitate the communication between Fort Yuma and San Diego. The distance between those places is about two hundred and twenty-five miles, and Vallecita is about half-way. Beyond it, toward the Colorado, there is little or no grass, so that trains, after they have crossed the desert, usually stop a day or two here to recruit their animals."

Not liking the poor grass at Carrizo the mules stole away and returned to Vallecita and had to be brought back. When the party came a little nearer the desert they found "an innumerable quantity of the bones and dried carcasses of sheep." There

were thousands of them lying in piles within the space of a hundred yards. Undoubtedly this wholesale slaughter of innocents was caused by their traversing the desert and, after being three or four days without water, they could not be restrained from drinking themselves to death when they reached Carrizo Creek.

The major part of the traveling was done in the evening on account of the intense heat, the thermometers often registering as high as 110° to 114° Fahrenheit in the shade.

That evening, in order to overcome a steep sand-hill, ten mules had to be hitched to each wagon, and one of them was upset and rolled over and over to the bottom of the hill, smashing the medicine chest.

The "day's march" to Alamo Mocho was made through the night of June 6, and forty-five miles was traveled without a moment's rest. "In long marches like this with pack-mules it is not considered advisable to stop; for no rest can be given to the animals without relieving them of their packs, to do which and replace them would require at least two hours. If a pack-train stops without relieving the mules of their burdens, the animals lie down and attempt to roll, an operation which disarranges the packs and often does much injury. When there is grass and water it is well, on long marches by daylight, to rest an hour or two during the heat of the day. Feed and water at such times, with rest from their loads, afford much relief, but when there is nothing to offer the weary animals, it is decidedly the best course to hasten on and complete the journey, unless it is too long to be accomplished in a day.

"The desert here is a vast open plain, extending as far as the eye can reach on every side, except on the southwest, where a chain of mountains appears some thirty or forty miles distant." (This is the range now known as the Cocopah range.) "The undulations are few and slight. Near our camp was a steep bank about sixty feet high, extending for miles, and descending to a great depression or basin, which appears to have been the bed of a lake. It was in this bed that the wells or pits were sunk from which we obtained water."

This dry bed was undoubtedly part of the desert now known as the Imperial Valley.

The rest of the journey was over the same route taken by Cooke, and while one of hardship was similar in experience to that of all people who are venturesome enough to face this portion of the desert during the hot weather.

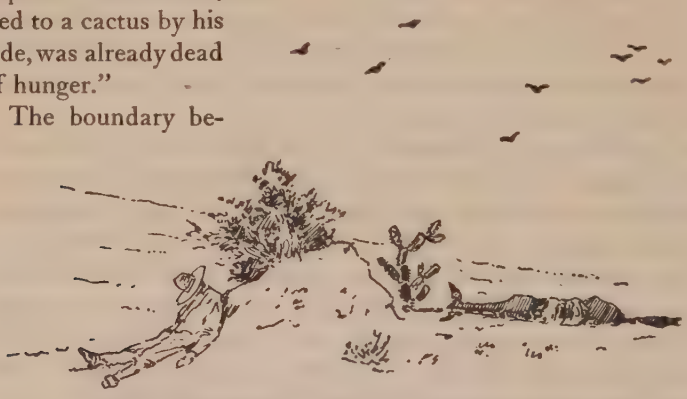
Of the gold seekers that poured into California in "the days of '49," many chose this southern route in order to avoid the high mountains and the snow. It is claimed that some 8,000 people entered the Golden State by this way, a few going to San Diego, but nearly all crossing the desert and reaching the mines either by way of Warner's Ranch or through the San Gorgonio Pass and Los Angeles.

It was at this time that the ferry was established at the Colorado River that laid the foundation for at least one large fortune; and from this period also date all the stories about men locating on the desert wells and water-holes and charging exorbitant rates for this absolute necessity of life and travel.

In his "Eldorado," Bayard Taylor speaks thus of the horrors of this desert route: "The emigrants by the Gila route gave a terrible account of the crossing of the Great Desert, lying west of the Colorado. They described this region as scorching and sterile—a country of burning salt plains and shifting hills of sand, whose only signs of human visitation are the bones of animals and men scattered along the trails that cross it. The corpses of several emigrants, out of companies who passed before them, lay half-buried in sand, and the hot air was made stifling by the effluvia that rose from the dry carcasses of hundreds of mules. There, if a man faltered, he was gone; no one could stop to lend him a hand without a likelihood of sharing his fate. It seemed like a wonderful Providence to these emigrants, when they came suddenly upon a large and swift stream of fresh water in the midst of the desert, where, a year previous, there had been nothing but sterile sand. This phenomenon was at first ascribed to the melting of snow on the mountains, but later emigrants traced the river to its source in a lake about half a mile in length, which had bubbled up spontaneously from the fiery bosom of the desert.

"One of the emigrants by the Sonora route told me a story of a sick man who rode behind his party day after day, unable to

keep pace with it, yet always arriving in camp a few hours later. This lasted so long that finally little attention was paid to him and his absence one night excited no apprehension. Three days passed and he did not arrive. On the fourth a negro, traveling alone and on foot, came into camp and told them that many miles behind a man lying beside the road had begged a little water from him and asked him to hurry on and bring assistance. The next morning a company of Mexicans came up and brought word that the man was dying. The humane negro retraced his steps forty miles, and arrived just as the sufferer breathed his last. He lifted him in his arms; in the vain effort to speak the man expired. The mule, tied to a cactus by his side, was already dead of hunger."

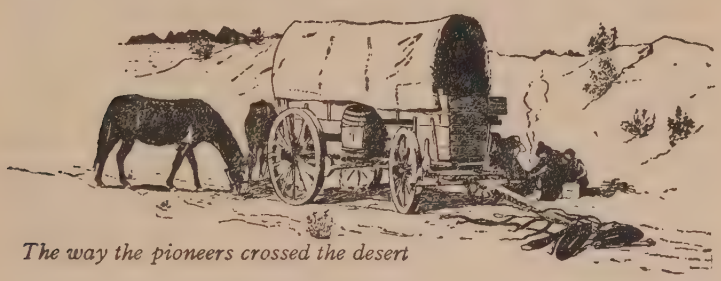


He was found dying, and near by his mule, dead

The boundary between Mexico and the United States duly determined, Jefferson Davis, then Secretary of War, prevailed upon Congress to authorize, March 3, 1853, explorations for a route for a railway from the Mississippi River to the Pacific Ocean. The geologist of that party was Professor Wm. P. Blake, now of the University of Arizona, and his report is full of interesting experiences and descriptions. To him is due the naming of the desert "the Colorado," as prior to his time it was referred to merely as the desert. Owing to an error afterward corrected, Mr. Blake's report confuses the two great ranges and peaks. It speaks of the San Bernardino on the north and the San Gorgonio on the south of the pass. The fact is that both of

these peaks are in the Sierra San Bernardino on the north side of the pass, and the mountain to the south is San Jacinto, the range of which here commences. It continues in a southerly direction over the Mexican boundary, where its offshoot, the Cocopah range, begins, and then forms a prominent feature of the scenery of Lower California. Professor Blake and the surveying party, under Lieutenant Parke, traveled over the route we are now growing familiar with to Carrizo Creek, and over the San Felipe Pass to Warner's Ranch. Then returning they took the Kearney and Cooke route to the Colorado River.

Blake in his report tells of traveling from the Big Lagoon to Alamo Mocho. "A mile or two beyond the Big Lagoon we came to the edge of another and smaller one, called the Little Lagoon.



The way the pioneers crossed the desert

It is much like the first, except that it is bordered with mesquite trees, which, in some places, grow very thickly together. We passed two canal-like channels, or wide gullies, in the surface, with mesquite trees growing in the bottom, and evidences of the presence of water at a former period. . . . These channels probably communicate with the two lagoons, and may be the bed of the stream called New River, so called from the fact of its sudden appearance in 1849. At that time the Colorado River was very high, and broke over a part of its banks between the mouth of the Gila and the head of the gulf. The water flowed inland, running backward through the desert toward the center of the valley once occupied by the ancient lake."

The emigrants of 1849 were much delighted and relieved to find this river, though Major Emory in 1846 does not mention it.

There is no doubt whatever but that it has existed ever since the Colorado Desert was formed, subject of course to many and various changes of channel, course, and level. Through it the overflow waters of the river reached the lagoons — what we now call the Salton Sink.

One of the strangest sights ever witnessed on the Colorado Desert was when a drove of camels crossed it in going from Fort Tejon to Albuquerque. Owing to the heat of the desert, the scarcity of water and feed, and the hostile nature of the Indians, the difficulties of transcontinental transportation were such as to daunt any Secretary of War, and for several years efforts were made in Congress to obtain an appropriation for importing a drove of camels for transportation purposes. Jefferson Davis was largely instrumental in finally obtaining the appropriation in March, 1855. A herd of thirty-three animals was bought in Africa, — nine dromedaries or runners, twenty-three camels of burden, and one calf. Among them were two two-humped Bactrian males for use in breeding with the Arabian female. Six Arabs, one of them a Bedouin of the desert, and a professed camel doctor, came over with the herd, which was successfully transported from Smyrna to Indianola, Texas, where they landed May 14, 1856. After a few days' rest they were marched by easy stages to San Antonio and thence to Green Valley, sixty miles farther on. Here they camped and experiments were made. One day, Major Wayne, who was in charge, sent three six-mule teams, with a wagon to each team, and six camels to San Antonio for a supply of oats. In going the camels were held back to accommodate the slower pace of the mules. Returning, the camels carried 3,648 pounds of oats, while the wagons brought 1,800 pounds each. Thus three camels were equal to six mules and a wagon, and, in addition, the camels came to camp in two and a half days, while the mules were nearly five days in covering the distance.

The great strength of the camel was demonstrated at Indianola. A number of people had expressed their skepticism as to the ability of the camel to carry heavy burdens, so Major Wayne sent for one of the best of the herd, and, having caused it to kneel, ordered two bales of hay, each weighing three hundred and fourteen pounds,

placed upon it. The knowing bystanders were convinced that the camel could not rise with such a load, but they laughed in scorn when the major ordered two more bales piled on, making an aggregate weight of one thousand two hundred fifty-six pounds. To the amazement of all, and to the utter confusion of the scoffers, the camel at the word of command easily rose and walked off with his burden.

Another herd of forty-one animals was bought and brought over by Lieutenant Porter, landing in Indianola, February 10, 1857.

In the fall of this year Lieutenant Edward Fitzgerald Beale was ordered to open a wagon road from Fort Defiance, New Mexico, to the eastern frontiers of California, and a part of the herd of camels was put at his disposal for this expedition. The journey occupied forty-eight days through an unexplored wilderness of forest, and plain, and desert, the Colorado River being reached October 18. Lieutenant Beale was most enthusiastic in speaking of the work performed by the camels on this arduous trip. He says that they saved the members of the expedition from many hardships, and excited the admiration of the whole party by their ability and willingness to perform the tasks set them. He started with the determination that the experiment should be most thorough, and subjected the camels to trials which no other animals could possibly have endured. On the desert they carried the water for the mules; traversed stretches of country covered with the sharpest volcanic rock without injury to their feet; climbed with heavy packs over mountains where the unloaded mules found it difficult to go even with the assistance of the dismounted riders; and, to the surprise of all the party, plunged into rivers without hesitation and swam them with ease. The lieutenant concluded that he would rather have one of the camels for such work than four of the best of his mules.

With such an introduction it is a source of wonder that the camels are not in use to-day. But adverse circumstances soon arose. The officers who knew how to handle the camels were transferred elsewhere, the mule drivers were incompetent to direct camels and unwilling to learn, and some of the creatures' supposed virtues were found to be vices. As J. M. Guinn writes: "He could travel sixteen miles an hour. Abstractly that was a virtue; but

when camp was struck in the evening and he was turned loose to sup off the succulent sage-brush, either to escape the noise and profanity of the camp or to view the country he was always seized with a desire to take a *pasear* of twenty-five or thirty miles before supper. While this took only an hour or two of his time, it involved upon his unfortunate driver the necessity of spending half the night in camel chasing; for if he was not rounded up there was a delay of half the next day in starting the caravan. He could carry a ton — this was a commendable virtue — but when two heavily laden 'ships of the desert' collided on a narrow trail, as they always did when an opportunity offered, and tons of supplies were scattered over miles of plain and the unfortunate camel pilots had to gather up the flotsam of the wreck, it is not strange that the mariners of the arid wastes anathematized the whole camel race from the beast the prophet rode down to the smallest imp of Jefferson Davis' importation."

The army horses and mules also were said to share the antipathy of the men. A camel was enough to stampede a whole herd, but this, as well as the other objections, could have been overcome easily had some officer had charge with intelligence and interest sufficient to teach the men how to handle the African animals.

When the Civil War broke out the camel proposition was almost forgotten. The herd was distributed among strangers who reported more and more adversely upon them. Finally orders were issued and the herd sold, most of them doubtless finding their way into menageries and zoölogical gardens. A few, however, escaped, and ever since there float in occasional reports of one or more camels having been seen on the deserts of Southern Arizona.

As a preliminary to the building of a railway a stage line across the desert was started in August and September of 1857. The San Antonio and San Diego semimonthly stage it was called. I. C. Woods was its founder and James Burch acted as contractor.

This continued for a year, when the Butterfield Stage-coach Line was inaugurated, semiweekly, under a six years' contract with the Postmaster-General at six hundred thousand dollars a year. In another chapter I give an account of the ride across the desert. The route reached from San Francisco to St. Louis, and the traveling time was generally from twenty to twenty-two days. On

special occasions, as the transmission of a presidential message, it has been done in sixteen.

Of all the later travelers over the desert none has written so vividly and interestingly as Clarence King, who, in his "Mountaineering in California," tells of the trip he made from La Paz, in May, 1866, to San Bernardino. Of the desert he says it "lies under the east slope of the great chain, and stretches eastward sometimes as far as five hundred miles, varied by successions of bare, white ground, effervescing under the hot sun with alkaline salts, plains covered by the low, ashy-hued sage plant, high, barren, rocky ranges, which are folds of metamorphic rocks, and piled-up lavas of red and yellow colors; all overarched by a sky which is at one time of a hot, metallic brilliancy, and again the tenderest."

In 1881–84 the lines of the Southern Pacific railway were laid, following in the main the survey over the desert made by the government in 1853. Since then most of the travel has been in comfortable, nay, luxurious cars, save to the miner and prospector who venture still into the secret places, the inner heart of the desert. While tardy county and state officials are at length bestirring themselves to do a duty that should have been done long ago, in the digging of wells and erection of sign-posts, there is still enough of danger to give the spice of hardship and adventure to those who seek it. The winds blow over the faint and uncertain trails, the moving sands either leave or cover them, the rains and cloud-bursts wash them away, and the fierce sun of midsummer beats pitilessly down upon them to-day as relentlessly and exhaustingly as when the first explorer set his foot in this wonderful region.

View of the desert from the "Hidden Lake" trail on San Jacinto Mountains

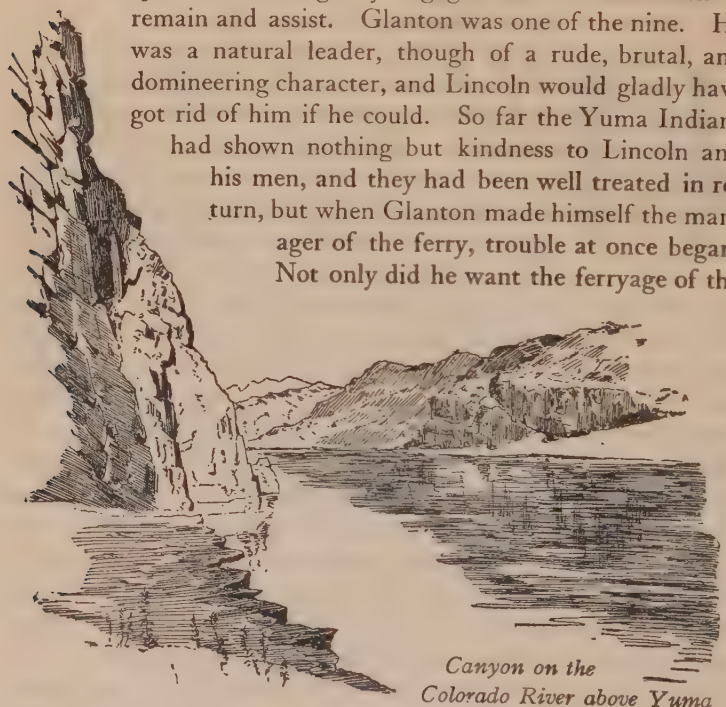
CHAPTER VIII

The Colorado River Ferry

UNTIL after the discovery of gold the first ferry established on the Colorado River was run by Indians. A General Anderson of Tennessee is said to have gone from Tucson to California, and on reaching the Colorado River built a boat for the purpose of crossing his company. He then presented the boat to the Yumas and gave them a certificate to that effect, on condition that they would cross all Americans at one dollar for a horse, one dollar for a man, and one dollar for the cargo (a pack), and that upon a violation of this contract by any higher charges than these the boat should be forfeited. The Yumas for a while plied this ferry at what was called the lower crossing, some four or five miles below Yuma, reaching the California bank near where Hanlon's ranch now is, or the upper end of the Algodones ranch. This was in the latter part of 1849 and early in 1850. The Indians seem to have kept their part of the contract faithfully. In the records of the time there are few complaints of ill treatment by the Indians and none, that I can find, about the ferry.

It was natural, however, that some thrifty white man should look upon this ferry with envious eyes when the Sonoranian immigration to the California gold-fields began. And it was left to Dr. A. L. Lincoln, a relative of the martyred President, Abraham Lincoln, to be that white man. He had come to California in 1849, and early in January, 1850, returned to the Colorado River. The possibilities of a ferry run by a white man appealed to him, but, not wishing to seem to interfere with the Yumas, he established his ferry at the junction of the Gila and the Colorado. This was a wise move, for the greater part of the immigrants came down the Gila and thus reached the Colorado first at this point.

The Sonoranian migration to the gold-mines was then at its height, and the ferry proved to be a most profitable undertaking. On the twelfth of February a man named Glanton, with a party, mainly of Texans and Missourians, came to the ferry, and although Lincoln then had six men in his employ, such was the work required that he gladly engaged nine of these men to remain and assist. Glanton was one of the nine. He was a natural leader, though of a rude, brutal, and domineering character, and Lincoln would gladly have got rid of him if he could. So far the Yuma Indians had shown nothing but kindness to Lincoln and his men, and they had been well treated in return, but when Glanton made himself the manager of the ferry, trouble at once began. Not only did he want the ferryage of the



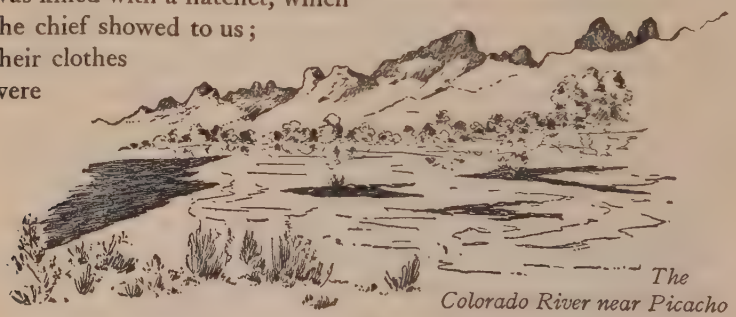
Canyon on the Colorado River above Yuma

American travel that came by the Gila, and thus cut off that source of income to the Indians, but when he learned that many Mexicans had crossed and were crossing by the Indian ferry he became furiously angry. The Indians then claim that he sent his men down the river where they destroyed the Indians' boat, captured an American whom they found helping the Indians, with all his money, and that when Glanton saw and talked with the American he shot him and threw his body into the river. The chief of the Yumas said he then went to see

Glanton and made an offer that Glanton should cross all the men and baggage, while the Indians should cross the animals of the emigrants, and thus they would get along quietly. With a spirit that is not unusual even in this our day, Glanton repudiated such an offer, kicked the chief out of the house, and beat him over the head with his stick.

The chief then called a council of his people and it was determined to kill Glanton and all the Americans at the ferry. From the deposition of Jeremiah Hill, sworn to in Los Angeles, May 23, 1850, these facts are gathered. It was found that Glanton had gone to San Diego. On his return, the chief who had been insulted went to the ferry and found Glanton and his men drinking. They gave him something to eat and also some drink. After dinner, "five of the Americans laid down to sleep in a hut, leaving him sitting there; others were ferrying, and were on the opposite side; three had gone up on this side for some purpose. The chief said he watched till he thought the five were asleep, when he went out to his people on this side, who were all hid in the bushes just below the houses; a portion of them he sent up after the three Americans who were cutting poles, instructing his men to get possession of their arms. He had previously posted five hundred Indians on the other side, instructed to mix among the Americans and Mexicans, and get into the boat without suspicion. He himself then went up on the little mound perhaps as high as his head, but commanding a view of all his Indians, and the whole scene; from this mound he was to give the signal. There he was to beckon to those hid in the bushes to come near the American tents, which they were immediately to enter and give a yell as they killed the Americans, whereupon he was to give the sign with a pole having a scarf on it to the Indians on the other side as well as those who were watching the three from above. He gave the signal, when those in the boat and at the houses were all killed. The Indians who had been sent after the three Americans ran, but these three succeeded in getting into a skiff and escaped by going down the river. His men pursued on the shore, on both sides, but several were killed by the Americans, and many wounded. He showed us two of the wounded, and when asked if 'as many as ten' of the tribe were killed he said, 'More.' He said one of the

Americans would row while the others fired, and his people hesitated to pursue further. When the chief went up to see Glanton, as above stated, about the ferry, Glanton said that he would kill one Indian for every Mexican they should cross. He showed us by signs the amount of money in bags which he took from the Americans' camp. It seemed from his description to be about three bags of silver, each about three feet high, and about two feet around, which must have contained at least $80,000, besides a bag of gold, about a foot high and a foot round. This he said he divided amongst his people, then burnt the houses over the bodies of the dead. The six who were killed in the boat were thrown into the river as fast as they were killed, all killed with clubs. The five on shore were killed with clubs except Glanton, who was killed with a hatchet, which the chief showed to us; their clothes were



The Colorado River near Picacho

burnt, and perhaps their flesh somewhat burnt by the burning of the little shed of brush in which they had been killed; their bodies were then thrown into the river. After giving this account of the transaction, the chief said that, upon the death of these Americans, another council was held as to whether they should kill all Americans who should come along, at which it was resolved by every Indian that they would. He said that in two days they could muster 4,000 warriors; he said their arms were principally bows and arrows and clubs; and that they had a few guns, including all the arms they got from Glanton's party, but that they intended to collect all they could from every source."

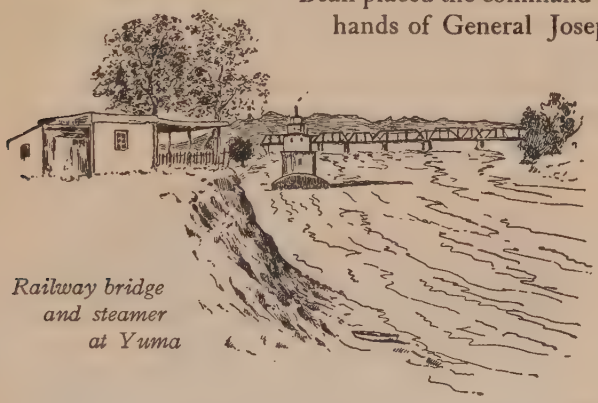
The three Americans escaped and reached San Diego in safety. As they passed New River they saw two Yuma Indians who in-

Photo. by H. C. Tibbitts, San Francisco, Cal.

TAUQUITCH CANYON AND SAN JACINTO MOUNTAINS, NEAR PALM SPRINGS, COLORADO DESERT

formed them they were on the lookout for any Americans who might come from San Diego to fight them. They were hostile to the whites and wanted them to know it.

At this time it was supposed that fully seventy-five to one hundred American men, women, and children were on the way to the Colorado, coming down the Gila River. This and the fact of the massacre led Governor Burnett to order the sheriff of Los Angeles to enroll forty men, and the sheriff of San Diego twenty, to be placed under the command of General Bean of the state militia and to proceed at once, punish the murderous Yumas and reduce them to a proper state of mind toward traveling Americans. General Bean placed the command in the hands of General Joseph C. Morehead, who delaying his preparations, found the people of Los Angeles unwilling to furnish supplies for his scrip, alleging that the alarm had subsided. The gallant general then seized by force what was required, paying by drafts on the state treasury at an extravagant price, and set out with forty men and supplies for a hundred over the desert. That was a wild and boisterous march. Meeting emigrants on the way the force was increased to one hundred twenty-five, and these rough and turbulent spirits, with full rations, more liquid than solid, marched to the reduction of the Yumas. The Indians fled up the river at their approach, but they were not pursued. Morehead and his men settled down to a fierce attack on their rations and kept it up until the governor ordered an immediate disbandment. The order was disobeyed on the ground



Railway bridge and steamer at Yuma

that the traveling bands of Americans still needed protection, but when it was repeated in most peremptory fashion the "force" retired. This adventure did not one particle of good and cost the state $120,000, $76,588 of which was for the goods purchased by Morehead and the balance for the forceful levies he had made.

This trouble led to the establishment, the following November, of Fort Yuma, and Major Heintzelman, who had been stationed at San Diego, was made commanding officer. Either by his direction or under his protection a party left San Diego in May, 1850, fully equipped to build and operate ferry-boats at the crossing where Lincoln and Glanton had lost their lives. This ferry was successfully operated for a while and then it came to the hands of Diego Yaeger, who, for many years, continued to operate it. Yaeger was a German by birth and also a born frontiersman, with all the thriftiness of his race. He made a good thing out of the ferry. The military had to cross and recross, and they also had to purchase large supplies of beef, beans, vegetables, and animal forage. And need it be added, that the military at this desert post were glad to have an obliging capitalist close at hand who could and would, for a consideration, "help them out" when funds were short, "until next pay-day"? Suffice it to say that the ferry of the Colorado, with its perquisites, made a fortune for the German frontiersman.

To-day the ferry is still there, but with the opening of the Southern Pacific railway in the early '80's it has ceased to be of a highly remunerative character.

CHAPTER IX.

Storms, Mirages, Desert Illusions, and Temperatures

THE Colorado Desert is no exception to other deserts in its liability to storms. The peculiar topography of the desert and its surrounding country indicates its possibilities in this direction.

About midway between the Colorado Desert and the Pacific Ocean stands the gigantic mountain barrier of the San Bernardino and San Jacinto ranges, with an elevation of from 9,000 to 11,000

A settler's home on the desert

feet. At the point of junction between the two ranges, with an elevation of but 2,808 feet, is the San Gorgonio Pass. On the west side of the pass the fertile valley of San Bernardino and Santa Ana slopes down to the sea, and on the east side the rugged boulder-strewn slope leads to the hot, dry, sandy bowl, 287 feet below sea-level, of the Colorado Desert. Temporarily portions of this bowl are filled with water, the Salton Sea, but this is a condition of less than a year's continuance, and

ere another year is gone may again have reverted to its normal condition of dryness. Between the head of the pass and down as far as Mecca the verdure has grown wonderfully in the past four years, owing to the discovery of artesian water, and south of the Salton Sea the Imperial Valley has also produced a large amount of crops as the result of irrigation. Yet it is nevertheless true that a tremendous area both of flat sand-plain and rocky mountain slope and the trench-like valleys between are practically verdureless and therefore act as vast reflectors of the heat of the sun. During the daytime, when the sun shines directly upon these radiating surfaces, the heated air arises in great volume. Whither shall it go? To the east similar columns of hot air are ascending from the Arizona deserts, and northward from the Mohave, while to the south there is only the comparatively narrow passageway of the Gulf of California. Air must conform to natural law the same as water, and while it is capable of compression (as is water), it will seek an outlet before yielding to much pressure. This outlet is found over the western range (the San Jacinto) where, passing over to the Pacific Ocean, it is quickly cooled and ready for its return passage. For, on cooling, it descends, and, feeling the suction caused by the ascension of air on the desert, it rushes in to fill up the vacant spaces. Reaching the range of mountains it ascends again here to come in contact with the ascending hot column from the desert. The suction, therefore, is tremendous at such places of low level where there is a pass over or through which the cooled air may flow. The San Gorgonio Pass is the largest and most accessible of these passes, and through it the air flows with great force. The high walls of the pass may be regarded as the pump, while the desert acts as the suction valve, compressing and drawing the air toward it at the same time. The result is the wind blast before referred to that bends the trees over toward the southeast and that may be relied upon most of the days of the summer months.

Two interesting series of phenomena owe their existence to this blast. It is not an ordinary shifting breeze, but a constant and powerful current sweeping through the pass with such violence that myriads of fine grains of sand are lifted from the

dry channels of the streams and the ever-shifting masses of mountain detritus and are carried along, down the slope, until they find a resting-place on the desert. Just above and below Palm Springs station one may see the effects produced by this lifting up of the sand by the wind. Wherever there is a tree, or a bush, or a tiny plant in the path of the blast the sand particles on the upper side are lifted up and carried away so that often the whole root of the plant is exposed. The space between plants is swept as clean and smooth as if one had gone over it with a sweeping machine that could adapt itself to the irregularities of the heavier rocks and pebbles and pick up only the sand. On the lower side the particles seem to cling and arrange themselves in a peculiar shape, long and tapering to a point, the base resting at the stem and with its size determined by the size of the plant.

Moving sand-hills near Indian Well

Many large rocks have their recumbent, tapered, half obelisk or cone of sand made in like fashion. Professor Blake says that "the movements of sand in the air are precisely similar to those that take place when it is immersed in the more dense fluid, water. The progress of the grains along the surface of the plain, and their final rest at the edge of the bank, is precisely similar to the transportation of sand by a stream, and its deposition, in the form of a bank, whenever the current enters deep water. In water little eddies and back currents are produced by a projecting rock, or root, acting as a barrier to the current, and drift-sand accumulates on the lower side of such obstacles. So, in air, wherever a slight obstacle, such as a bush or boulder, stands on the plain, exposed to the wind, the driving sand accumulates on the lee side."

Another phenomenon owing its existence to the sand blast

is found in the smooth, even glassy polish attained by the telegraph-poles. Many of the ties and bridge timbers look "as if some industrious Dutch housewife had washed and scrubbed them with soap and water, until they resemble in their whiteness the boards of her own kitchen floor. Glass bottles, left for a short time on the ground, lose their original appearance, and are ground inside and out." The most striking effects, however, are seen on many of the rocks below the pass and elsewhere, which are polished and smoothed or cut and bored into remarkable shapes. The limestones subject to this sand attrition have a peculiar, rounded and smooth surface, which resembles that of partly dissolved crystals, or deliquescent specimens of rock salt.

The homogenous granites have long grooves cut into their surfaces, deep enough to receive a lead-pencil, and the granites of unequal hardness present most interesting results. The

A wind-storm in the desert

abrasion being most rapid upon the softer feldspar, the masses of quartz, tourmaline, and garnets stand out in relief, or, where the harder rock faces the wind with the feldspar behind, it is worn away to a point, similar to the sand behind the bushes.

Vertical surfaces of rock exposed to this sand blast are cut in curious fashion. The harder masses act as a protection for the softer feldspar, beneath which it is chiseled and cut into tiny columns, upon which rest, as caps, the quartz. Where the feldspar is charged with small garnets, and is directly in front of the wind, the garnets are left standing in relief, mounted on the ends of long pedicles of feldspar, — jeweled fingers, pointing in the direction of the wind.

Sand-storms on the desert! What a feeling of terror comes over us when we read or even think of a storm of this character overtaking the desert traveler! There are sand-storms *and* sand-

storms, and I have experienced several kinds. It is no uncommon thing to see the sand carried along into the atmosphere so that the sky is largely obscured, but that need not be attended with more than trifling discomfort. But when the very atmosphere itself seems made of sand, so that every breath you breathe fills mouth, nostrils, bronchial tubes, and lungs with the tiny yet distressing particles, and when, in addition, the sun's fiercest rays are condensed by this sandy atmosphere as through a lens upon the hapless traveler beneath, so that he is almost suffocated by the heat, which is made more intense by the scorching character of the wild wind itself, then one knows to the full the real terror of the desert, the demon in all his fury, the archfiend that is worse than Death. It is generally easy to tell when the storm is coming. To a heavy sultriness of atmosphere is added a feeling of tenseness as if everything were gathering itself together ready to make a spring upon you. The very intensity of the feeling unnerves you and deprives you of the power to resist the coming onslaught. The horses, burros, and mules are restless and uneasy. They whinny and whine and whimper in their semi-articulate way trying to voice their sense of the distress in store for them. The palms are as silent and still as if they held their breath. Everything is still and motionless. Even the coyote knows enough to seek and keep shelter when the desert is thus tightening its muscles for the conflict.

Then, suddenly, the wind comes. In a moment the palms wave their tufted heads like green billows in an angry sea, and their voices fill the earth as the roar of the waves fills the sea. In the distance the sand-waves come, reaching from the face of the desert to the very zenith. Rolling and tossing, reaching out waving arms with fiercely clutching fingers as a mad demon of frightful size and power bent on destruction, they dash along. The sky is filled with bloody gold, and the sun has red instead of gold in its blood. As soon as the storm reaches us we are immediately enveloped as in a hot mist of dry sandy air. No arrangement of words can equal the concentration of misery and wretchedness one feels at such a moment. At first one is utterly blinded, staggered, stunned. Gasping for breath, whirled about, buffeted, even thrown down, he knows not what has happened, what is

happening, what is going to happen. As soon as eyesight is gained the animals are found huddled together, their tails turned to the fury, which now roars as an intermittent furnace. It is as if the demon were trying to scare and stifle you at the same time. Parched, one takes a sip from the canteen, and hearing the low moaning of the animals, he feels their wretchedness. They, too, are suffering for water. But to give it in a bucket is impossible, and experience has taught me not to try to do so. I pour it into a bottle and then, throwing the animal's head back, pour the warm fluid down its throat. It is neither satisfying nor refreshing, yet it seems to meet some demand. Hour after hour the heat pours down, drying every particle of moisture out of you it can capture. You feel you are drying up, and yet the water you

Part of the great sand-hills

drink gives you no relief. The sand fills everything, — eyes, ears, nostrils, mouth, clothes, pockets, are full of the tiny, hot particles. To breathe is a distress, to eat impossible. The animals lie down and writhe and groan in their helpless distress. In pity for them I have wrapped up their heads in canvas, and they seemed to comprehend I was doing it for their relief.

For such a storm to last an hour is a fierce distress that seizes a strong man with such a grip that though he is a fighter through and through, he almost cries out for relief. To suffer it for two or three days is a maddening torture. Three times I have experienced this kind of a storm.

Yet summer storms of this nature are far rarer than the fierce storms of winter. Then the sultry heat gives place to piercing

cold that cuts through and through you as a stabbing dagger. It is as if all the heat of summer had suddenly been converted by magic into biting cold, and the hot blasts of the scorching sirocco exchanged for a frozen wind from the ice-fields of the Arctic.

The one is just as dangerous as the other; the unwary traveler on the desert is liable to perish in either. Their rarity is their chiefest comfort, and their entire absence the only blessing they can confer. Familiarity with them does not breed contempt, nor do they improve on acquaintance. One dare not speak disrespectfully of them, so even now I have stood up and turned around, making the needful signs, — as many people do when speaking of the devil, — that when I next go on the desert I may not be punished for my temerity and disrespect.

Of one phase of a desert storm I have not yet spoken; that is its fury where the hand of man has made an oasis. One has often watched the fierce waves of a storm-tossed sea leap with wicked anger upon the land. So the winds of the desert leap upon the trees and verdure and houses that the oasis has planted upon the desert's bosom. It is the jealous rage of an exacting and vengeful lover. It comes like a foaming tide that strikes and then surrounds, falling back to gain new strength to strike again with renewed power, roaring and eddying, dashing and clamoring, taking the tall trees as in giant hands and bending them over toward the ground. It slams the doors, rattles the casements, and sometimes carries away the roofs of the houses of the proud, strutting creatures called men, who build these places as their shelters. When they enter them, and close the door upon the battling storm and then gaze upon its fury through the windows, wearing a smile that seems to sneer at its impotence and anger, how can the Desert Demon contain itself? It must destroy this pygmy, puny creature. It must drive him forth from the home of its beloved, where, hitherto, it has reigned supreme. And with renewed vigor and force, with unquenchable anger it lashes itself into new fury and continues the attack.

Inside the house the wind and sand penetrate, the latter covering everything with its pale gray pall, the former shaking and fluttering every piece of hanging drapery, lifting up the rugs and carpets as if some uneasy spirit were confined in them that

wished to escape and join the army of tossing, torn and misshaped things outside that were being driven headlong by the fury of the storm.

Can one be in or gaze upon such a storm and not feel all the peace he has gained on the desert disappear? Most certainly! To me the storm is clarifying, purifying. I have no resentment against the storm that even beats me down and compels delay and produces great discomfort, weariness, distress. David knew what the heart soon learns, viz., that even the "stormy wind fulfils His word." God is as surely in the fire and whirlwind, in the storm and the tempest, as in anything, and he only can find constant, secure peace who *knows* that there is no storm outside of God.

The faint roads and trails on the sandy portions of the desert are

A desert graveyard

often entirely obliterated by the sand-storms. Either the sand is bodily transferred by the wind, thus leaving not the slightest trace, or the road is covered by the sifting sand and thus disappears. The results to the traveler, unless he be very familiar with the desert, are equally disastrous. It is bad enough to be on the desert in stormy times with well-defined roads and trails, but to have them obliterated always means distress, often disaster, and sometimes death.

Fortunately sand-storms are not too prevalent. March, as elsewhere, is the month of bluster and wind, and then the blasts from the north and west coming over the snow-clad summits of San Jacinto and San Gorgonio are cold and piercing. I have often slept out of doors in late March and the winds have been both piercing and cold at that time.

The heat waves on the desert produce most astonishing optical illusions. I have a lady friend who has taken up a desert claim.

She was once riding along in the heat of a summer's day, the whole face of the desert palpitating and vibrating with the heat waves, when, suddenly, in the distance, her eyes fell upon a moving object that was so large and singular that it instantly filled her with inconceivable terror and dread. Here, visible to her own eyes, while she was as calm and sane and in full possession of all her faculties as she ever was, a monster sea-serpent was approaching her. It seemed to be fully a quarter of a mile long, and it came toward her, humping itself in sections exactly as an inchworm or caterpillar humps itself in traveling. It was no illusion! It was a serious fact. The thing was coming, silently, stealthily, but really, positively, actually. For a few moments the poor woman was absolutely petrified with such a fright as she had never felt in her life. What could she do? Fly? That was useless, for the creature was approaching with a speed far greater than her old and weary horse was capable of. In her horror she sat still, incapable of decision or action until the object itself relieved her of all fear. It was a freight train of very great length, coming on the track alongside of which she was driving, and the heat waves vibrating over and upon it had produced the optical illusion. The air vibrations also had the further effect of magnifying the cars so that altogether it made a truly terrifying spectacle.

I have seen the same phenomenon many times. It is startling and horrifying even when one is used to it, so much so that one laughs at his own dread as soon as the train has time to correct the impression of fear the startling object immediately creates.

The track-walkers tell me that when they first saw the tracks humping up and down in this same fashion they were sure an earthquake was approaching and stood breathless, waiting for the awful and destructive shocks, which, however, never came.

I remember on one occasion going with the section-men on their "pump car" to Salton. As we approached the station the salt-works were "without form and void." It is impossible to put into words the peculiar appearance they presented. One could see some object in the landscape, but it was not stable, and it was of no recognizible shape. It was a nonesuch. It was

in constant movement as if under the influence of an earthquake that shook with rhythmic movement, up and down, across and lengthwise, simultaneously. It was the most singular looking object I think I ever beheld in my life, and the movements were weird and strange beyond any description. I thought I knew everything in the locality, but this certainly was novel and strange. As soon as I could I went to investigate and to my utter amazement, as soon as I got near enough to dispel the effect of the heat waves, I found it was nothing but the buildings of the salt-works. The thermometer registered 115° Fahrenheit in the shade.

The most famous as it is perhaps the best known and least understood of all desert illusions is the mirage. The poet Moore

Mirage. Inverted mountains in the sky

could think of no more miserable doom for the traitor than to invoke the judgment of Heaven upon him in the mirage:

> "May he, at last, with lips of flame,
> On the parched desert thirsting die,
> While lakes that shone in mockery nigh
> Are fading off, untouched, untasted."

A thousand and one different mirages have been described, but, after twenty-five years of experience on several desert areas, I have come to the conclusion that while the mirage is most wonderful, the general descriptions are often the work of a vivid imagination which heightens and enlarges upon that which it sees.

Clarence King, however, describes the Colorado Desert mirage with truth: "In the indistinct glare of the southern horizon, it needed but slight aid from the imagination to see lifting and

tumbling of billows, as if the old tide were coming; but they were only shudderings of heat. As we sat there surveying this unusual scene, the white expanse became suddenly transformed into a placid blue sea, along whose rippling shores were the white blocks of roofs, groups of spire-crowned villages, and cool stretches of green grove. A soft vapory atmosphere hung over this sea; shadows, purple and blue, floated slowly across it, producing the most enchanting effect of light and color. The dreamy richness of the tropics, the serene sapphire sky of the desert, and the cool, purple distance of mountains were grouped as by miracle. It was as if Nature were about to repay us an hundred-fold for the lie she had given the topographers and their maps.

"In a moment the illusion vanished. It was gone, leaving the white desert unrelieved by a shadow; a blaze of white light falling full on the plain; the sun-struck air reeling in whirlwind columns, white with the dust of the desert, up, up, and vanishing into the sky. Waves of heat rolled like billows across the valley, the old shores became indistinct, the whole lowland unreal. Shades of misty blue crossed over it and disappeared. Lakes with ragged shores gleamed out, reflecting the sky, and in a moment disappeared."

The following descriptions were written at the moment of observation and in every case confirmed by my companions.

A common mirage often seen is of a long spit of land, covered with trees and set off with water which shimmers and glistens between the land and the observer. Again and again from Frinks and elsewhere have I observed this, the land spit lined with water, reaching out apparently for miles into the desert beyond.

Here is a large and beautiful sheet of water dotted with tiny islands reaching from a volcanic butte to the Cocopah range, miles away, completely covering land that I walked over a week ago and which I must traverse this afternoon. Did I trust only to my observation I could swear that this is indeed water, for to the right of this same butte is the Salton Sea that I know is water, and save for the fact that the "mirage water" is of a lighter hue than the sea, one is just as clear and distinct to the vision as the other.

Standing in the center of the track and looking up or down between the rails, water often appears to flood them as far as the eye can see. This mirage is many times accompanied by a slight mistiness above, as of smoke or steam arising.

Oftentimes the mirage from the southeast side of the desert looking southwest will have the appearance of an arm of the sea flowing smoothly and easily up to the bases of the Cocopah Mountains. All the intervening country is a vast, placid, rather lifeless, yet apparently real and genuine ocean.

Where I now sit writing (March 29, 1906) in my boat, anchored up a small slough on the east side of the Salton Sea, I can see three distinct and separate water mirages that no eye can possibly discern the falsity of. Here to the left and behind me is the genuine Salton Sea, the whole contour of which I have studied in many hours of wearisome rowing; to the left, well up in the foot-hills of the San Bernardino range toward Yuma, are the curving shores and tiny bays of another Salton Sea, while to the right below Signal Mountain in Mexico the Cocopah range is split up into small sugar-loaf islands, dome islands, and patches that remind me of Nantasket Island more than anything else, with a vast lake lying in the whole basin beyond the Salton to the mountains. The other sea is between these two on the alkali flats that separate the real Salton from the mirage Salton. It is peculiar white water, with dancing waves scintillating in the afternoon sun.

I have a friend who assures me that on one occasion he and a party of strangers were on the desert in the middle of summer, when the heat waves combined with the mirage produced most peculiar effects. One member of the party had never seen a mirage. When the phenomenon appeared he was surprised beyond measure. The mirage took on the appearance of a vast sea, and the vibration of the heat waves gave a vivid resemblance to white-capped breakers rolling in upon the shore that made the illusion perfect. The stranger expressed astonishment at the presence of the ocean. He "thought it was on the other side of the mountains." When told that it was a mirage, an illusion, he was grossly offended, and thought his companions were making fun of him. Couldn't he believe his own eyes? Had he not seen the ocean often enough to know it when he saw it? Just then an

added illusion came in the form of that which he took to be a schooner, and in triumph the believer called upon the unbelievers to see the vessel. Did not this prove his contention? Did imitation or mock vessels come on an imitation or mock sea? There was the ship, and, ah! there were others, and breakers, and the shore, and trees beyond, and houses, all of which confirmed him in his belief. And not until the mirage finally disappeared would he believe that he had been deceived.

Mirages are not always the effect of heat. I have often seen mirages in the cool of the early morning, when the desert sky was completely overcast and not one ray of direct sunshine anywhere. Even now, as I write, the conditions are like this, yet far to the south, seen between the lava piles south of Volcano station, is a great sea in which the Sierra Prieta bathes, while the upper end

A desert mirage

of the Cocopah Mountains is cut up into islands and long spits of land on which trees are growing, and between us vessels are moving to and fro. The same condition exists at the southern end of the Cocopahs — as far as visible — the whole of that end being lost completely in the mirage-like effects which cut up the range into islands and gigantic mushrooms that seem to remain supported by most slender stems.

This peculiar style of mushroom mirage is to be seen almost daily on the Colorado Desert anywhere south of the Indio. Volcanic piles that stand out isolated on the desert floor are slowly transformed from solid masses with broad bases anchoring them to the earth to shimmering, tottering, purplish mushrooms and toadstools of gigantic size, oftentimes of irregular round shape, sometimes perfectly round, but more often to a somewhat regularly shaped gigantic cigar, each end of which rests on "mirage water" which glistens and shimmers in the desert sun.

On the early morning of March 29, as we rowed across the south end of the Salton Sea, the whole San Bernardino range toward the east offered us an ever-changing panorama of mirage effects. My companion and I both saw it at one and the same time. He cried out as I was about to do so, "Cantilever bridge and structural ironwork!" It verily appeared like a vast cantilever bridge, with somewhat irregular steelwork, but clearly defined, connected with a vast extension of piled-up steel columns that reminded one more of the steel-framed sky-scrapers of New York in the process of construction than anything else.

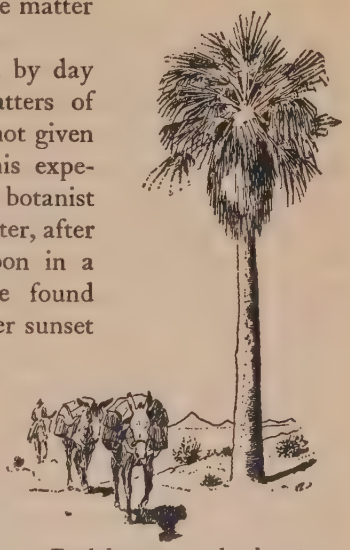
One afternoon, looking toward the southeast where I knew the tops of the great sand piles of the old sea beach alone could be seen, we were treated to a series of mirages of singular delicacy of color and grace of outline. The color was of straw, or with a very delicate tinge of salmon, and the shapes were of trees, of varying forms and varieties, but all swaying to and fro in the breeze.

The mirage is an optical delusion, yet it seems real. I often feel as I gaze upon it that it is a type of one side of mankind. People look at their fellows, and think they see certain things. They imagine palaces and temples and towers and lakes and bubbling fountains. When they come nearer they find out their mistake. These things were delusions; there was no reality in them, and the disappointed go away and refuse to see the good in their fellows because all they imagined is not also there. The question then arises: Is the ground on which the mirage appears responsible for the mirage? Is it to be condemned because it does not fulfil all the promises of the mirage? Scarcely. Then should the disappointment of those who see mirages in their fellows be visited upon the innocent victims of their imagination? Let us be more rational in our dealings with our fellows. Let us not condemn them for things they should not be held accountable for, but let us rather seek for all that is good and hold that up for the survey of ourselves and others.

A question is often raised on the desert by cattle-men and others that is worthy of serious consideration. Do cattle *see* water, or do they *smell* it. If they only smell it, then a mirage can never lure them to death. Most cattle-men will tell you that

cattle never see water. I do not believe it. I have seen cattle struggling to reach mirages, and in the southwestern corner of the Colorado Desert, where more mirages appear than anywhere else, are the bones of thousands of cattle. In one of Mr. Eytel's forceful paintings a drove of cattle is being taken across the desert. In the distance behind them lies a mirage. The cattle have stopped and two of them are bellowing in their anger that they are not allowed to go and quench their thirst in the mirage water. Critics have censured the picture as untrue to life. I take issue with them on the grounds stated. I shall be glad to have the matter discussed by scientists and others.

The intense heat of the desert by day and cold by night are often matters of much wonder to those who have not given the subject much thought. In his experiences on the desert, Coville the botanist says: "Often on the desert in winter, after working during a sunny afternoon in a warm and comfortable tent, we found ourselves within a few minutes after sunset chilled and shivering. We observed a frequent daily fall of temperature from 70° Fahrenheit to a few degrees below the freezing point. In summer a similar daily range occurs, but with higher extremes."



Pack-burros on the desert

While a full presentation of the question is one that would demand far more knowledge than I possess, a few simple statements may help to a clearer understanding. All the heat of the earth comes from the sun. Tyndall has proven that heat is but a mode of motion. The vibration of the sun's rays cause a corresponding vibration of the ether which surrounds the known universe. This ether acts in, and through, and independently of, the aqueous vapor of our globe. The ether vibrations, when they strike the earth, set the surface molecules in action, which thus become

radiant heat waves and have their own initial power to radiate. But the sun's rays are different in quality from the earth's rays, and substances that absorb the one do not necessarily absorb the other. Through a layer of water, for example, one-tenth of an inch in thickness, the sun's rays are transmitted with comparative freedom; but through a layer half this thickness no single earth heat-ray could pass. This singular fact accounts for the heated envelope of the earth that preserves life at night. Were there no aqueous envelope the heat of the sun during the day would be converted into earth heat and would be radiated back into the ether with great rapidity. But when night-time came and there were no heat waves from the sun the little heat remaining in the surface molecules of the earth would be so speedily radiated that severe frost would ensue and life be destroyed, ere the morrow's sun could shine. This is now prevented by the absorption of the earth's heat-rays by the aqueous vapor surrounding the earth. This becomes heated by the absorption of the earth's heat waves, and retaining the motion during the night, wraps our earth around in its warm envelope to our protection from the deadly chill that would otherwise ensue.

Here, then, we have the secret of the intense heat of the desert in the daytime and its corresponding coolness during the night (except of course in those special cases where other factors come in and complicate the problem). During the day the sun's heat waves strike the floor of the desert with slight interference or interruption from either aqueous vapor or impurities in the air. This gives great direct heat. But as there is little or no aqueous vapor in the atmosphere above the desert floor there is nothing to absorb and retain the responsive earth heat waves, and when the sun goes down these earth waves speedily give out their force and a rapid lowering of the temperature is the result.

Wherever drought reigns, whether in the Sahara of Africa, on the heights of the Himalaya, in the heart of Australia, or on the Colorado Desert, the effect is the same and refrigeration at night is most painful.

CHAPTER X

The Colors of the Desert

I DO not propose to attempt a learned dissertation upon the causes of the marvelous color effects seen upon the desert. I find in my note-books various descriptions written with especial reference to color and I deem these of sufficient interest to present in this form.

In all ordinary conditions the colors of the desert are well defined and distinct. Especially are the shadows strong and vivid. The blacks remind one of the shadows cast by the mountain ranges on the moon, when observed through a powerful telescope.

During the sand-storms the mountains that shut in the northwestern end of the desert undergo marvelous transformations. The atmosphere becomes charged with fine sand and dust particles upon which the sun reflects and plays as the clouds that intervene between it and the dust allow. Late in the afternoon this dust becomes luminous with a half-transparent color-light that glows and shines and makes the whole mountainside appear as a veritable mountain of transfiguration; as if the "glory of the Lord" shone upon it. One feels in looking at it that he is on holy ground and must not only take his shoes from his feet but uncover his head in awesome reverence.

Then, if his attention be called away, and he look again fifteen minutes later, the divine glow has gone, and a sullen, bluish, sodden effect takes its place. The sand-veil is there, but no longer illumined by the sun. A little later, and it becomes a misty purple, and night finally curtains it with its darker shades.

The sun is just rising over the Chocolate range. For an hour the eastern sky has been a changing glory of orange, fiery red, and madder brown. Now as the sun bursts over the hills and

floods the desert the range to the left is outlined with such distinctness as to suggest a black silhouette on a white background; but the color is royal Tyrian purple instead of black, and the background a luminous pearly opalescence that shades off into the pure blue seen only over desert and southern ocean skies.

At this early hour the light shining at so low an angle reveals the different ridges of the San Bernardino range with a vividness that is startling to one who has seen them before only in the direct light of noon. Now each ridge stands forth as clear and distinct in its own individuality as can be. The "pip, pip, pip" of the quail is heard on every hand; the wild deluge of

Group of palms on the desert

song of the mocking-bird; the cheery warble of the linnet; and from the distance the faint crow of the domestic rooster calling his family out to gather the early worm.

The peculiar lighting of these early sunrise hours well repays much and careful watching. The beams of light strike through certain passes in the mountains, flooding slopes and peaks and ridges beyond with patches of vivid light and color, while other places are kept in shadow by the arresting of the sun's beams by giant mural faces or higher peaks close at hand.

How the delicate tints of the desert appeal to you seen in contrast with the strong colors! Here are the browns, grays, reds,

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PALMS IN THE CANYON NEAR INDIO, COLORADO DESERT

and greens of the mountains, with the greens and purples which shade into blackness, and stand out vividly against the pure white of the snowy peaks beyond. Then there are the deep black gashes of the canyons, with here and there a patch of delicate pea-green showing that trees are growing near running water in the mouths of the canyons.

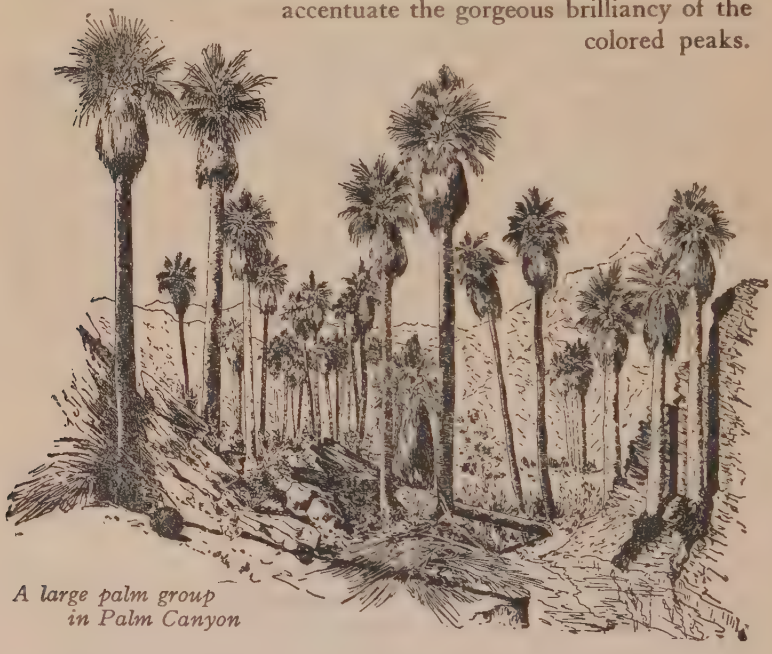
At dawn, and equally at sundown, everything seems bathed in a soft greenish gold atmosphere giving to animals, moving figures of men, silent wagons, gently waving trees a peculiarly mysterious appearance that one can hardly describe and that is never felt or seen away from the desert.

On the morning of March 30, when I awoke, the whole sky was filled with clouds. The stars were scarcely to be seen; only one here and there. The air was motionless above, though there was a slight surface breeze blowing from the east. Everything was somber and gray until dawn. Then began the color changes. When the sun emerged it was cautiously, as if afraid of disturbing the quiet peace of this tranquil scene. There was none of that vigor and force and decision that one feels in Browning's sunrise:

> "Faster and more fast,
> O'er night's brim, day boils at last:
> Boils, pure gold, o'er the cloud-cup's brim
> Where spurting and suppressed it lay,
> For not a froth-flake touched the rim
> Of yonder gap in the solid gray
> Of the Eastern cloud, an hour away;
> But forth one wavelet, then another, curled,
> Till the whole sunrise not to be suppress'd,
> Rose, reddened, and its seething breast
> Flickered in bounds, grew gold, then overflowed the world."

Here the quiet gentleness was most apparent. The color changes also came quietly. Slowly the San Jacinto range deepened into a sullen purple, entirely different and distinct from that luminous purple that is the joy of color lovers in Southern California mountains. Only for a few minutes was there any tinge of color in the sky, and that was a peculiarly rich salmon red; but, all at once, right in the center of the field of vision a single

cluster—if I may so speak—of the peaks of the Sierra San Jacinto blossomed into a luminous madder lake,—not of solid, pure color, but variegated enough to give it rich beauty,—all sunlit and gorgeous. The startling vividness of it was enhanced by the somber purple of the rest of the range. It seemed as if it and the immediate sky had been deluged with a strong blue solution, such as the laundresses use, only of quadruple strength. Even the snow-caps on San Jacinto and San Gorgonio were blue, and this dolorous color served marvelously to accentuate the gorgeous brilliancy of the colored peaks.



A large palm group in Palm Canyon

This morning with the sky all somber and colorless the Salton Sea is a pale yellowish green. I have never seen it of this color before, though this is not an unusual color for the desert. A similar tone is seen extending along the foot-hills from the northern edge of the alkali flats of the sea until the feet of the Chocolate and San Bernardino Mountains are reached.

I have also seen the Salton Sea when it possessed a deep violet

color. This was in the late afternoon when the direct rays of sunlight were no longer upon the water.

The desert sky is sometimes so luminously splendid, so glowingly glorious, so fit for the pathway of cherubim and seraphim, of angels and archangels, nay, of the very God, that one feels he is looking on the streets of heaven, and he waits expectantly, entranced, breathless, as if at any moment stately and loving presences might pass which only the pure in heart could gaze upon and live. And then comes the passionate prayer: "Oh that I might see them and live! Oh that I might see them even though I die, if thereby all evil be taken from my heart!"

A Coahuilla basket of beautiful natural colors

As I look at these colorings and remember the attempts I have seen on canvas to reproduce them and then the comments I have heard on these canvases I am stricken with amazement at the self-conceit and folly of men who constitute themselves critics of the work of other men. Not for the attempt of the artist to reproduce have I any rebuke. He is but doing his duty. He sees and therefore should try to make others see. Yet however much he fails, the critic who knows nothing of the desert and its colorings, save what he has seen as his Pullman, with blinds drawn, has dashed over the desert, will complacently and with an *ex cathedra* air exclaim: "But the coloring! It is impossible! No one ever saw such colors as that in Nature!"

That is what I object to. No one — not even Titian, Velasquez, Rembrandt, Corot — is competent to make such a statement unless he has first reverently, and as a learner, gone to the desert and, with alert eyes, watched and watched and watched. Late at night, early in the morning, through the night even, and

at all hours between dawn and sunset, he must keep his vision ready and his soul receptive. Then, and only then, is he competent to tell what the Divine Colorist puts upon the skies and the earth for his pupils to copy. For the desert is God's color show-room; His divine exhibition salon to which He freely invites all men, — artists, colorists, decorators, mere lovers of color. — men and women with alert eyes and awakened souls to see beauty in all its nakedness: beauty so sublime, so awful, so stupendous, so awe-inspiring, as to be capable of full comprehension only by those souls that love the real more than the false, the simple more than the complex, the nakedness of Nature more than the prudery of Man.

On the trail to San Gorgonio Mountain

CHAPTER XI

Some Wild Animals of the Desert

I AM neither zoölogist, ornithologist, nor hunter. Nor do I propose to make this chapter a catalogue. I merely wish to record a few personal observations.

Life on the desert is as hard for animals as man; the struggle for existence as great. When one first comes in conflict with the fierce heat, the sand-storms, the long stretches of alkali or salt-sown soil, the piles of moving sand-dunes, the scarcity of water, he is assured that no animal life of any kind, by any chance, can sustain itself in such an untoward place. But, as I have fully shown, these are not all of the desert. There are fertile spots, delicious oases, mountain slopes and canyons, on and in which plenty of verdure grows, where pure mountain water flows, in abundant volume, so that, when the conditions are all considered, animal life on the desert does not seem quite as strange and impossible as before.

Mountain lion

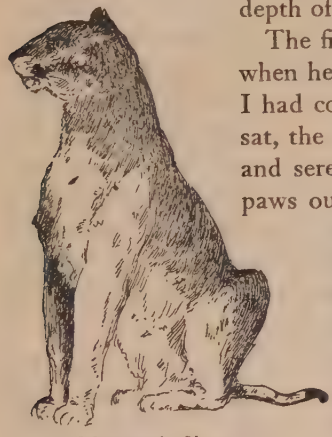
The largest wild animal seen on the desert is the mountain lion, more commonly known as the panther (*Felis concolor*). This member of the carnivorous tribe is large enough to thoroughly frighten an unarmed man, — as I always am, — unless, conscious of his own kindly intentions, he is willing to take those of the

animal for granted. This is not always a safe thing to do, as the mountain lion will attack a man if he is driven by either hunger or fear. A friend and I were once climbing a steep mountain trail in the heart of a dense forest. I was in the rear, carrying on my shoulder a very heavy tripod, reinforced with brass, and with long spikes at the ends of the legs. Stopping for breath, I happened to look up, and there on the branch of a tree, not ten feet away, was a large mountain lion just about to leap upon my unconscious friend. It was the work of a moment to

"Just about to leap upon my unconscious friend"

swing up my tripod in lance-like fashion over my friend's shoulder in the uncontrollable impulse to do something, what I did not know. Was it good fortune, or chance, or Providence that pointed the spikes of one of the tripod's legs at such an angle as to penetrate the eye and brain of the leaping animal, swerve it from its course, render ineffective its wild, death-dealing stroke, and so blind it that a few blows from the brassy end of the tripod killed it? The remarkable thing of it all was that my friend was not only unharmed, but almost unaware of what had happened until it was all over. He was an old man of somewhat slow mind, and when he heard my exclamation as I threw up the tripod he turned around to see me thrown topsyturvy down the bank. The cause of it he did not see. Before he was aware of it, his amazement was made complete by my sudden and energetic rising, picking up the tripod and fiercely swinging it upon the head of some prostrate creature which, until I struck it, had not made the slightest sound. Then it began to shriek and scream with a fierceness

that was appalling. Being blinded in the one eye, and possibly sympathetically affected so as to be unable to see with the other, his frantic strokes, which assuredly would have killed had they fallen upon either of us, went wild, and the long and strong tripod with its brass top, which had so often been scoffed at by my camera friends as cumbersome and ugly, out-of-date and preposterously heavy, became a most formidable weapon in the hands of a strong man. In far less time than it has taken me to write this story, the animal was dead at our feet. The force with which he sprang can be understood by the fact that the wooden part of the tripod beyond the spike had crushed the bones surrounding the eye, and had penetrated to a depth of fully an inch and a half.



Mountain lion

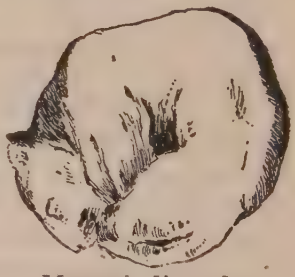
The first time I saw a mountain lion was when he was unconscious of my presence. I had come upon him accidentally, and he sat, the very embodiment of dignity, as calm and serene as a huge tomcat, his head erect, paws outstretched, as if enjoying the wonderful outlook that had so enchanted me. He was sleek and fat, and his skin of good color. Save for a patch of almost dead black on the upper lip and reaching out to both ears, his body was a tawny brownish yellow, with a streak down the spine of slightly darker color. The belly was of a much lighter yellow, almost a dirty white. The tail was long and bushy at the end, which was darker in color, almost black. He was on the edge of one of the San Jacinto "forest islands," where deer are not scarce, and from his sleek and self-satisfied appearance I assumed he had just slain and eaten his share of a deer. Whether he saw me or not I do not know, for I edged away and never saw him again.

In hunting deer they are very wary and stealthy. They have all the feline's noiselessness and ability to steal on their prey. What terrible shoulders they have, how muscular, and how powerful! How swifter than any human motion is the blow of

those paws, in each of which are steel-sharp claws that tear to the heart of their victims, through skin, muscles, and flesh! Long-bodied, as wiry as a snake, more serpentine than the tiger, the mountain lion is preëminently fitted to be a hunter of deer, mountain sheep, or rabbits. It is very seldom he is seen down on the "floor" of the desert. The mountain is his range, for there he finds his prey. With a craft that seems almost like conscious thought he steals down to the edge of a precipice and looks over into the forest valley beneath where the innocent deer are browsing. Then, with stealthy but swift tread he finds his way down and around to where he can best sneak upon the helpless and simple creature. With one terrific spring, generally without any vocal noise, he lands upon the back of his victim, gives one or two stunning blows and tearings with those awful paws, then the crunch of his teeth into the spine tells that the killing is done.

Mountain lion watching his prey

On the Pacific Coast the mountain lion attains as large a size as three hundred pounds and has a maximum length of eleven feet from head to tip of the tail. I am assured that it can leap fifty feet at a jump.



Mountain lion asleep

It must not be thought that the mountain lion, the wildcat, or the wolf are common in the desert. They are seldom seen, and each year they become rarer. One might wander for years on the desert and never see one of any of them, and I know of many desert dwellers who are totally unaware of their existence.

The wildcat (*Lynx rufus*) is not so long in body as the moun-

tain lion, but stockier and with leonine shoulders. While I have seen trails on the desert, the animal itself has never appeared in sight except in the mountains or in the tree-lined portions of the banks of the Colorado River. There is some difference between the common American wildcat and the Texas species (var. *maculatus*), and it is possible that both species are found in the range of the Colorado Desert. I have seen two specimens also which do not exactly conform to the descriptions of either. The base color was a lightish red, which shaded off into light gray and black. Large spots of the reddish color were interspersed on the back and sides and on the limbs. The belly was pure white. The hair was long and thick and small tufts grew on the tips of the ears. One of these I had in captivity for a long time. While I always watched him carefully, he grew tame and ate from my hand, though always with a suspicious air as if he thought I intended to do him an injury.

Desert wildcat

One was caught early in 1906 in Mecca, where he had doubtless come to raid hen-roosts. He is said to be an adept at pulling shingles from the roof of a hen-roost, and helping himself to the choicest specimens.

By far the most interesting of all desert animals is the mountain sheep, of which a rare variety is found in the San Jacinto range on the desert side, way down into the peninsula. It is known to scientists as the *Ovis Nelsoni*. The sheep seen throughout California generally is the *Ovis Montana*. The differences between the two are readily apparent in that the southern ani-

mals are smaller and have shorter hair, it being stiff and harsh and well calculated to give its wearer protection against the severest weather. Its color is softened peachblow, when seen in January and February, but later in the summer, while it still preserves this color, it is less striking and vivid. Seen in contrast to the rich and deep greens of the trees, and with the gray granite all around, two or three of them give a note of color to the landscape that is peculiarly beautiful.

The specimens that I have seen have been far from wild, as I had been led to expect. While curious and much interested in my movements they did not scare and run as many of the bands I have seen in the Grand Canyon and its tributaries have always done. Of late years the Indians tell me they have hunted them but little and this may be the secret of their tameness.

They can be found in the high regions around Mount San Jacinto and on the Torres and Santa Rosa Mountains, Palomar, the Cuyamacas, and the Cocopah Mountains.

The first description (and best, for a short and popular account) I have ever seen of the mountain sheep is that given by Fray Alonso de Benavides, the Franciscan, in 1630. He says:

"There is a genus of mountain sheep, very great and with very bulky horns. And up a wall, though it be high and smooth, they clamber at speed; or up a high cliff as it were by a ladder. And frisking or in flight they are wont to fling themselves from the highest cliffs downward, falling always head first, and they rise immediately with all nimbleness, as if they had done nothing." [1] But for a full, popular, and intimate account full of life and poetry, there is no description in English literature as full and vivid as that of John Muir in "Mountains of California."

Mountain sheep were numerous in the early days of the gold excitement. The Indians often shot them with their arrows and traded the meat to the argonauts. Dr. Veatch, in 1857, tells of passing the trail of a flock of them, and seeing the head of one, probably killed by an Indian hunter.

Deer and antelope are both fairly plentiful on the mountain-sides near to the desert, though there are fewer antelope than

[1] Land of Sunshine, Vol XIII, page 436.

deer. How well I remember my first sight of a band of antelope! They were — where I have never seen one since — miles away from the mountains and in the very heart of the desert. Their curiosity was the thing that attracted me most. Gentle, beautiful, large-eyed creatures, they look and look and look as if fascinated, and provided you can keep them curious and free from fear they will remain watching for a long time. Any one who has ever seen an antelope must have noticed his large eyes. They are larger than a deer's and far more protuberant. They are constantly needed for their owner's safety as, though his sense of smell and hearing are as acute as those of the deer, he seems to trust his eyes the most. When curious or alarmed they seem to bulge out and such is the scope of their vision that they can see what goes on behind as well as in front. I kept this band watching me for several minutes by lying quite still but keeping up a constant fluttering of my pocket-handkerchief. At last some sudden movement alarmed them and they were off like a flash. With an easy, graceful, swinging gait they bounded along, fairly annihilating space, and in an incredibly short time were out of sight.

American deer

The deer is a far more interesting animal to me than the antelope. He is so gentle, so timid, so beautiful, and yet so valiant a fighter when he has to be, and though shy, I have several times found him fearless and friendly. On one occasion I was alone in the mountains and had just stopped for lunch. I had thrown saddle and bridle on the ground, hobbled my horse, and with a long, dangling neck-rope, had turned him loose to graze. For shelter I had stopped in a little clump of cottonwoods. As I rested there, half reclining, a buck, doe, and a fawn came along into the copse, browsing. When they saw me they looked curious and interested, but there was not the slightest suggestion of alarm. I made no movement, so they went on

browsing and for nearly half an hour I had an opportunity to watch them at close quarters. When, finally, I arose and went for my horse, they disappeared in the brush some distance away, across a small grassy open space. But let them be alarmed and how they fly along! They and the antelope are larger editions of the jack-rabbit. With leaps and bounds they dash uphill and down, over brush, through dense chaparral, and over sharp and cutting rocks where neither horse nor man can follow them, and are soon lost to sight. In captivity they are most friendly and will follow one around gently and shyly, begging for sugar or nuts. I have had wild desert deer and antelope both so tame in a few weeks that they would "nose" into my pockets for sweets or nuts that they knew I generally carried for them. They are also fond of raisins.

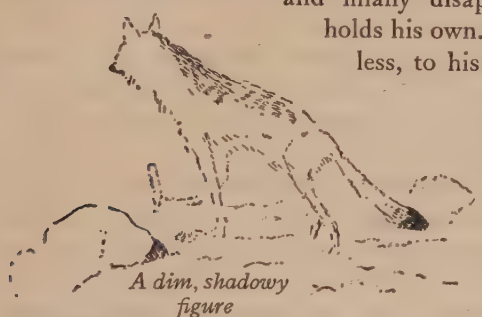
Don Coyote

Coyotes are quite common on the Colorado Desert. Madge Morris in her poem tells of the continued howling of the predatory creature, and many California readers will remember the fierce controversy that raged in a San Francisco paper, caused by Ambrose Bierce's sarcastic and scathing criticism of this line in Mrs. Wagner's poem, he contending that a coyote barked and did not howl. The fact is that coyotes both howl and bark, and one of their chief characteristics is the power to prolong and apparently multiply their musical performance so that the uninformed listener is convinced that he is surrounded by a fierce herd of frightfully vicious creatures all seeking his life and eager to drink his blood. When several animals unite their howls, barks, yelps, and almost unearthly screams or other noises, the effect surpasses belief. "It must be heard to be fully appreciated." About the only good thing in connection with the coyote's howling is that it is silent throughout the day, his desire for musical expression becoming uncontrollable only at night.

The coyote is a small prairie wolf. The name is Spanish, and is pronounced *ki-ó-ty* (the *y* short as in happy). Several varieties of coyote have been noted on the desert. In size they

may be said to be intermediary between the fox and the larger wolf, though they vary largely in the different species. Don Coyote possesses a sharp-pointed, fox-like muzzle, upright ears, and a long, bushy tail, which he carries with a grace and dignity peculiarly his own, except when being pursued, when it is hidden between his legs. In winter the hair is thick, of a dirty reddish gray, with a few black hairs generally scattered on the shoulders and the back. The skins, when properly dressed, make fine rugs and buggy robes, one that I used to have, made of twelve skins, having given me good service for many years.

Unlike most wild animals, the coyote does not seem to be much disturbed by the advance of civilization. Other animals decrease and finally disappear, but the coyote holds his own. This is owing, doubtless, to his sneaking and thieving habits. Domestic animals and fowls afford him a never-ending source of food supply, and his natural craft, cunning, and wariness make him a hard creature to poison or trap. Every settler in the desert has had some experience with the coyote, and many are the stories I might tell of his skill in evading capture.



A dim, shadowy figure

Don Coyote is no epicure in the matter of diet. Given the opportunity, however, he would feast on delicacies like a lord. Indeed, when an undefended chicken corral is unexpectedly revealed to him he kills only to eat the daintiest parts of the bird. But his fastidiousness leaves him — as it does many another epicure with less legs — when hunger becomes his companion. He will then prowl into the orchard and take a bite of watermelon, preferably ripe, of course, but watermelon anyhow if there be nothing better. He will pick up the apricots that drop from the tree and, indeed, almost any kind of ripe fruit, and is especially fond of grapes and raisins. The mesquite bean, too, is one of his constant foods, and the Pimas tell a story in which the coyote

is made answerable for the wide distribution of their god-given mesquite, through the evacuation of the undigested beans. A similar story is told by the Indians around Palm Valley as to the distribution of the native palm (*neo Washingtonia filifera*) by the same process. The coyote is very fond of the tiny date of this palm. He also eats the juniper berry, manzanita berry, and the fruit of the prickly pear.

His fondness for sheep, colts, calves, pigs, goats, and chickens, and wild game, such as deer, antelope, ducks, and geese, is partially offset by his habits as a scavenger. Were it not for this he would be an unbearable pest. But he kills large numbers of gophers, rats, ground squirrels, chipmunks, prairie-dogs, and rabbits. The latter are a great pest at times, even on the desert. When there is a scarcity of food they gnaw the bark from fruit and shade trees, vines, etc., so as often to destroy them, and the coyote's service in keeping down the number of these tree-destroying pests is invaluable.

A mere outline

The largest coyote I ever saw was shortly before we entered the Salton Sea, when coming down the Alamo River. He was on the bank above us, in full sight, and appeared to be as large as a timber-wolf. With leisurely steps and slow he moved along, stopping now and again to get a good look at us, as we glided forward in our boats.

Two of the commonest animals of the desert are the jackass-rabbit, so called from his long ears, and the cottontail, so named from his bunch of white, fluffy, cottony tail.

Did you ever notice the difference in the running of a cottontail and a jack-rabbit? It is then that you realize how different the two animals are. The cottontail is much smaller than the jack-rabbit, — shorter in the leg and body. He is not made for swift running. He hides in the brush and is seldom found away from spots where there is plenty of undergrowth. But the jack-rabbit is built for speed. He is a racer. His "lines" all show either design for that purpose, or wonderful development in that direction.

Take a walk with your swift hound some afternoon where jack-

rabbits most do congregate. Don't urge your dog to hunt, but just look carefully at that jack-rabbit, as your dog starts him from his cover. Legs? No! he has no legs. They are zigzags of lightning covered with fur. He is the most perfect running machine ever constructed. His hind legs touch the ground simultaneously, and the moment they strike, the lightning is released and springing muscles and nerves shoot the body forth, as if from a catapult. It is an incredible bound, and the process is repeated with a regularity that is as astonishing as it is easy. See the dog who chases him! He is *working!* He consciously puts forth all his strength and exhausts every effort to reach the easily moving creature ahead of him. His neck is stretched out, his legs make frantic endeavors, his sides heave painfully at the desperate work of his lungs, but all in vain. He is plainly outdistanced and his howls of anger and vexation soon show that he is aware of the fact.

The kangaroo-rat (*Dipodomys merriami similolus*) and trade-rat are both found on the desert. One day as I sat writing in the old dining-house at the Granite Mine I heard a little noise above me, and there, walking on the roof-plate, was a fine specimen of a kangaroo-rat. He was evidently on his way to what food supplies he could pick up around the table. His large eyes and scoop-shaped ears, his soft color and rapid, easy movements were most pleasing, and if one could ignore the pilfering and, worse still, the gnawing and destroying habits of the creatures, there would be much to enjoy in looking at them.

The trade-rat, or more properly the bush-rat (*Neotoma Mexicana*), is one of the interesting animals found on the desert edges. He builds his nest at the foot of a tree or under and between rocks. It consists of a series of arched galleries of sticks and twigs, filled up with moss and dung, terminating in a bed of moss, hair, and leaves. When at the base of a tree the nest is piled up instead of lengthened out, and I have seen them four and five feet high. The common name, given to this rat, is caused by his trading instincts. Like all rodents he is a great thief, and will gnaw his way into the miner's shack or settler's shanty at the first possible moment. Any articles that are left around are likely to strike his fancy, and these he bears away. But such is his

scrupulous regard for the appearance of honesty that, for the box of pills, the shaving-brush, the comb, the knife, the napkin-ring he takes away he brings and leaves a stick in its place. Hence his name. I have had miners and others tell me that they always knew exactly how many things had been stolen by the number of sticks piled up, these clearly determining who was the thief. But this I regard as rather apocryphal. This cunning little creature will find his way into your pockets — even that of a woman's dress — and steal therefrom whatever takes his fancy. I was sound asleep one night, when all at once something struck me on my body. In the dim light I saw that a large trade-rat had jumped upon me. Lying perfectly still I watched him. My trousers were hung up on the door near by — the quarters were small — and as I watched he made a spring, reached the trousers and ran up them to the top. There he hunted around, found the pockets and proceeded to rifle them. My knife, keys, and a piece of stick I used as a wedge on my camera were abstracted. The money was too slippery, I guess, so, going to another pocket which was full of string, he proceeded to pull this out, dropping everything stealthily upon the floor beneath. Just as he started off with his plunder I scared him. Now what I should like to know is: Would he have traded with me for everything he took, and if so, would he have put his exchanges on the floor, or have put them in my pockets? If the latter, would he have put everything in one pocket or in those he stole from? I wish some one would test Neotome Mexicana in these interesting particulars.

I must not forget to state that trade-rats are very fond of the succulent leaves and young shoots of the various species of cactus, so that they thrive well on the desert, provided they are in a cactus zone.

CHAPTER XII

Some Desert Birds

ONE great compensation for many unpleasant and disagreeable things about the desert is that there is a large variety of birds to be seen. This is neither surprising nor remarkable when the diversified character of the desert is understood. Palm Springs has such a unique climatic character that expert ornithologists have spent much time there. It is the boundary line between the warm, desert climate of the south and the colder climate of the farther north, and on this account one of the best locations for the study of migrating birds in the country.

In midwinter of 1903–4 Professor Joseph Grinnell of Pasadena, California, spent nine days studying the birds of this locality, and in *The Condor* for March, 1904, he gives a most interesting account of what he and his companions (chiefly Mr. Joseph Mailliard) found.

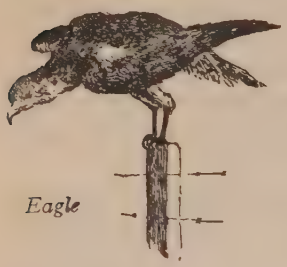
Hummingbird and nest

The desert and valley quail were both found in abundance, though, owing to the persecution of both Indians and whites, they were very wild. Mr. Mailliard thus comments upon the differences between the desert quail (*Lophortyx gambeli*) and the valley quail (*Lophortyx vallicolus*):

"The notes of the desert quail differ from those of the valley quail in variety, and to a certain extent in character, though they have some notes in common. The 'crow' of the latter consists of three notes, varying in length and accent according to the call given, in one case the last note being a falling one.

The 'crow' of the desert quail, while rather similar to the other, has two additional notes at the end, rendered in a softer tone. Besides the alarm-calls the valley quail has a few twittering or conversational notes, while the other species has a lot of these, quite varied and often given in a way that seems remarkably loud to one accustomed only to the notes of the former. Another peculiarity of the desert quail is the queer sound that it makes as it rises from the ground on being surprised into flight — the sort of screeching cackle, on a small scale, that a hen makes when frightened from her nest."

In some parts of the desert both species are found in large numbers, and they are unafraid, as neither whites nor Indians have attempted to shoot them.



Eagle

In the winter time, in the most unexpected places, wherever a few trees clustered, I have been delighted with the unconsciously noble singing of the mocking-birds (*Mimus p. leucopterus*).

One night we made a dry camp,— that is, stopped where there was no water for beast nor for man, save the little in the canteen. As soon as the sun set we halted the burros, took off their packs and turned them loose to graze. They wished to hover about "camp" for the water we could not give and finally we were compelled to drive them away. With reluctance and remonstrance clearly expressed in their reproachful eyes and dejected mien they wandered off and soon consoled themselves with what forage they could pick up, especially enjoying the gallenas grass which grows profusely for a mile or so.

After a frugal evening meal it was not long before we unrolled our blankets and went off to sleep. During the night I was awakened by the sweet and prodigal melody of a mocking-bird, perched on a tree a quarter of a mile away. For a few moments I thought myself at home in Pasadena, listening to the glorious warbler who often cheers my midnight or later hours from among the orange trees, and then, suddenly as I rolled over in my blankets, my leg struck the sharp thorn of a cactus which the

night wind had blown into the right spot and in a moment the dear illusion was gone in the piercing pain of the present.

In the morning we found a line of trees, mesquites, cottonwoods, and desert willows, showing where the moisture of the winter rains was longest retained. On most of these trees the mistletoe had fastened itself, and in spite of our knowledge of its parasitical character we could not deny that the white berries give an additional touch of beauty to the green of the trees.

The birds, attracted perhaps by their beauty as well as their flavor, feed readily upon them. It is to these berries, too, that we must look for the solution of the water problem for the birds. Birds are often found in large numbers where there is no apparent water supply. Yet it is well known that birds must have water as well as men. How, then, are they provided? It is suggested that they fly to water and then return to these isolated and waterless places.

Eagle eating bird

An objection to this suggestion is found in the fact that they breed and rear their young in these places, and while this flying to and fro might be possible to them it would not be to their young during the first weeks of their existence. How, then, is the problem solved? It is solved by the mistletoe. The berries are a large part water and they thus become the water supply of scores of desert birds.

It is to the birds also that this parasite owes its large distribution. The seeds are evidently indigestible, for when they are voided after the processes of digestion they are still intact in the defecation. These seed-charged droppings lodge on the branches and in the crotches of the trees and in due time spring forth, striking their roots into the tree fibers and thus becoming part and parcel of the tree.

The elf-owl (*Micropallas whitneyi*), the smallest owl in the world, is a desert denizen. It is seldom more than five and a half inches high. It feeds on insects and small snakes. Alighting on the back of its prey it darts its sharp claws into it, speedily killing it.

The *Courier del Camino*, or road-runner (*Geococcyx californianus*), is often seen on the desert. It receives its Spanish name from the fact that it is generally seen on the road and when followed runs ahead with great fleetness, until, either tired of the game or afraid of being caught, it darts into the nearest bush for hiding. A Methodist minister of my acquaintance used to keep a fast horse and sulky, and drove over the same road every day for months, where several road-runners congregated. One of the birds seemed to wait regularly for his morning run. He came out of the bush at a certain place where there was a long stretch of road, and with a flirt of his expressive tail and an uplifting of his crest, would start off at full speed down the middle of the road. My friend then "let his mare go," and for half a mile or so the race was on. The road-runner could always keep ahead, but as soon as he was through he darted into the brush, to be ready, however, for the same race the next day.

The elf-owl

Road-runner

Owing to its pheasant-like appearance it is often called the "chaparral cock." Of all the desert birds this is the one that most appeals to me. While it is not rare, it is better seen in the out-of-the-way places, and though apparently exceedingly shy it soon becomes very tame and friendly when it finds that its confidence is not misplaced. On one of the ranches near Mecca a pair have their nest. Each morning one of them flies to an old stump and there coos somewhat like a dove. They come to the door for scraps and will almost take them from the fingers. When the land was being leveled scorpions and various other insects were being constantly turned up. The road-runners would follow in the wake of the scraper, and not unseldom, if they caught sight of anything in the scraper, would fly right down

and get it. One day a snake was killed and my friend's man picked it up on a stick and stood looking at it when a road-runner came and, taking it from the stick, ran with it to his mate and made a meal on it.

I have watched a road-runner when he thought himself unseen in the chicken yard of an absent Mexican. With lordly step and haughty demeanor he marched around among the hens and chickens, as if he were a true Spanish don in the presence of his inferiors. When the cackle of a hen denoted an addition to the egg supply, he strode toward the nest and coolly and deliberately pecked a hole in the new-laid egg and in a few moments had entirely swallowed it.

The preacher to whom I have referred once invaded a cactus patch where road-runners had their nest, and took therefrom two young birds. He turned them loose in his house, feeding them with scraps from the table. They soon became so thoroughly at home that they would run up to the minister and beg for food, just as will a dog. So fearless were they that in walking about he had to put his toe under them to throw them out of his way. He found them the most easily domesticated of any wild bird he had ever caught, and always speaks highly of the way they kept his tomato vines free from caterpillars, and his "garden truck" from insects and other pests.

Road-runner

Mr. George W. Glover, Jr., the editor of the *South Pasadenan*, writes his editorials under the name "Roadrunner," and he publishes in Pasadena another weekly paper which he calls solely by his editorial name — *The Roadrunner*. Mr. Glover is also interested in mines on the desert and occasionally leaves the editorial chair for a *pasear* on the desert. He writes me about the road-runner as follows: "Wild, alert, always on the lookout for danger, suspicious to an inordinate degree, he is yet wise enough to know his friends. Go into camp where I will on the desert, if I remain but one night I see little of him. If I remain

a week, before I break up camp I find it necessary to kick him from under my feet. At first he will come around the camp at a distance of several hundred yards, evidently sizing up the situation and seeking to know who his new neighbors are. When he finds that they are not aggressive he approaches nearer. Throw him out a few crumbs and he will run away, but he invariably comes back for them. After this he ventures nearer, and if you talk to him as you would to a human being you soon win his confidence. Once I camped at a spot for a week and had this experience with a pair of these birds, so that the last two days they were fairly familiar. They had been much interested in the small camp-fire, and whenever the cooking of meals began they were on hand. As I sat upon a rock holding the frying-pan in my hands they ran up to within a few feet, much interested in what was going on. When I left that camp those birds followed me for fully three miles, sometimes ahead of, and sometimes behind my wagon, but keeping me in their company."

Road-runner sunning himself

One of the most tenderly cherished illusions of California is that the road-runner is the deadly foe of the rattlesnake, and will fence the reptile in with a hedge of prickly cactus, and begin to tease it. When the angry reptile strikes, the road-runner so arranges the thorns that he leads the snake to dart at the prickles, and this so mortifies and humiliates it that it then strikes its fangs deep into its own flesh and dies.

One of California's most reliable authorities, T. S. Van Dyke, flouts this story as an altogether unreliable yarn.

While I have never seen it done, I have talked with desert men who assure me that they have, and until I know the road-runner better I cannot condemn the story as emphatically as does Mr. Van Dyke. One prospector with calm protestation of truth tells me that many times when he has been riding or walking along he has watched the road-runner swiftly moving at a distance. Suddenly he stops, looking sharply and steadily at a certain spot, while his tail bobs up and down, this side and that, corresponding

somewhat to the excited and agitated movements of his head, while his crest rises until it stands like the feather cap of an Indian war-chief. He has caught sight of his arch-enemy, the rattlesnake, sunning himself, and — sound asleep. With a rapidity as wonderful as it is stealthy, the road-runner dashes off and shortly returns with a bunch of the cholla cactus dangling from his bill. Gently he lays it down conveniently near to the sleeping snake. Then he goes and comes, each time returning with his bunch of chollas, which he lays alongside that which he has brought before, until at last a complete hedge is formed around the unconscious snake. When he awakens he finds himself a prisoner. In vain he tries to escape. The sharp needles of the cactus prick him too severely. Angry, wounded, and defeated he retreats in sullen anger, only to be irritated by the raised crest, fluffed-out feathers and sharp bill of the road-runner. He darts his vicious head forward only to strike the wounding cactus, and when at length he is wearied with the long conflict his feathered foe begins a vigorous attack. Striking here and there with his long, strong bill he soon kills the snake, and then, at his leisure, proceeds to eat him.

Blue heron

It is a good story whether true or not, and some day I intend to find out the truth or falsity, though, as I have stated elsewhere in relation to the horned toad, I have been unable in many years to make this interesting little creature do what a score of scientific observers assure me he often does. As yet I am not prepared to deny *in toto* the ability of the road-runner to do what so many affirm he does do.

As to its eating snakes, that I can fully confirm. I have seen it kill snakes, even the sidewinder, though Mr. Van Dyke suggests that this must be when the reptile is sluggish on a cold morning.

Three things arrest one's attention the first time he sees a road-runner. These are the size and flexibility of the tail, the curved end of the bill, and the erectile crest, and a fourth may be added

if one gets near enough to the bird to examine it closely, viz., its wonderful color. The feathers on the upper parts and wings are of a dull metallic olivaceous green, broadly edged with white near the end. There is a tinge of black in the green along this line of white, which itself is suffused with brown. The play of light on these feathers is exquisite, and the erectile movement of the crest is interesting in the extreme. Some of the crest feathers are a dark blackish blue. The tail movements are remarkable. I verily believe that if one were long familiar with the road-runner he might understand its thoughts purely by the motions of the tail. It reflects every mood of the bird. Like a Japanese conjurer with a fan, the road-runner can play upon your emotions and imagination with his tail until you come to think it gifted with almost super-ornithological power.

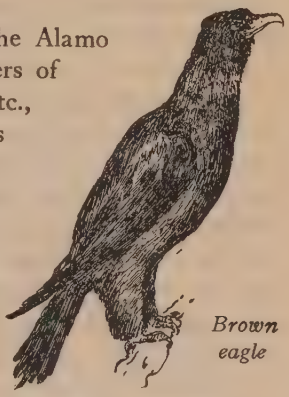
Flying herons

In size the bird is from twenty to twenty-three inches long, of which twelve or thirteen inches belong to the tail. Its eyes are very large and dark gray in color, with a dark blue iris.

The young generally leave the nest in early or mid-April, and it is no uncommon thing for the teamsters to the mines to run them down about that time. Even at so young an age they run with fair speed, but are easily tired, and then, seeking the shelter of a bush to hide, are easily caught. The eye of the road-runner is surrounded by a naked spot, which above it in front is a deep Prussian blue, under the eye it shades down to a lighter blue and nearly white, while behind the eye it is orange.

Thousands of a small bird that flies and skims the surface like a swallow are to be found in flocks at the south end of the Salton Sea. One morning I watched four different flocks of them. They flew to and fro, as close to the ground as possible, occasionally resting on the white salty soil. When they did so the birds at one end would fly, in sequential order, over the others and alight at the other end of the flock. As they kept this up for several

minutes I wondered whether it was a definite plan taught them by centuries of experience, for the picking up of the myriads of gnats that we found covering our bedding when we awoke. The vast quantities of these gnats can scarcely be believed, yet so large was their number where we cached our boat effects and supplies in the volcanic rocks at the southwest of the Salton, that as we walked along and they arose from the ground they made a noise that resembled the roaring of the sea, or the rushing along of a train, when heard at a distance.



Brown eagle

In the chapter on the trip down the Alamo River I have told of the vast numbers of pelicans, herons, gulls, ducks, geese, etc., that there abound. A number of hawks and eagles were also seen. There are many of the latter in the northern part of the desert, all doubtless having their eyries in the summits of the near-by mountains of San Bernardino and San Jacinto. The eagle is well enough known to require no description at my hands, but there is a sublimity in the flight of an eagle on the desert that is not felt in any other place. For, as the great bird arises, winging its fearless way directly into the eye of the sun, there is nothing to distract the attention from its heavenward flight. Here there is a sea of yellow nothingness below, and a sea of exquisite bluish-green space above in which this simple object of blackness floats and soars as though it sought entrance to the very palace of God.

The largest of all North American birds is sometimes found on the mountains of the western edge of the Colorado Desert. This is the giant condor (*Sarcorampus californianus*), and long supposed not to exist in California. As far as I can learn, it seems to be the link that binds the carrion-eating vulture to the live-flesh-eating eagle. As is well known, the eagle always prefers to kill its own food. The condor, on the other hand, though able to kill, prefers to find its meat fresh and sweet, but already

slain, while, on the other hand, the vulture is better satisfied with carrion than sweet meat.

In ascending, the condor has a spiral-like flight, though it sometimes gorges itself to such an extent that it cannot fly. Raising its wings it runs in a ludicrous manner, but cannot rise, and finally, with an air of resignation, it hops to the nearest rock or fence-post, and there remains until the effect of its feast has disappeared.

In appearance the condor is not unlike the vulture, though its feathers are of a uniform brown-black color. The head, down to the root of the beak, is covered with a beautiful lemon-colored loose skin, which sometimes deepens almost to orange. The beak is horny white, and curves over the lower bill, with a point as hard as iron. The under mandible is a perfect half-cylinder, into which fits with perfect accuracy a hollow tongue serrated with a hardened edging inclining down the gullet. The roof of the mouth has hard spinous points inclining in the opposite direction, and by forcing the meat it is eating against these spines it is torn and shredded in the process of deglutition.

When erect, the bird stands fully four feet in height, and is a most imposing creature, appearing at a distance perfectly black. In flight, however, it is more than imposing. It floats without the slightest effort, and is the most graceful of all objects that navigates the air. From the summit of the high mountains, where the air is light and thin and one can clearly see objects at a great distance, I have watched this wonderful bird with a pair of glasses for over four hours, without discerning the slightest motion of the wings, sailing to and fro at times with the merest "cant" of the body, and then remaining motionless. The wings are "flapped" when they begin to rise from the ground, but when fairly aloft, save in going along in direct flight, no such motion is necessary. As they rise a white band is revealed on the underside of both wings, but this does not extend across the body. An ordinary sized male will weigh twenty pounds, and its breast bone is eight inches across. It has two gizzards, the upper one small as a chicken's and the lower one four times as large. The inside of the large gizzard is lined as with coarse sandpaper.

There is a penalty attached to killing the condor, but as re-

cently as August, 1906, a band of four hunters, short of food, went out and killed a deer, which they bled and cut into quarters, putting it in the shade and covering it with their coats. A few hours later, when they returned, they found a giant condor on the meat, and he arose bearing a quarter of the venison in his talons. The four of them leveled their guns and shot simultaneously, and the condor fell with a broken wing. Though wounded, he put up a gallant fight, striking with his good wing and jumping directly toward his enemies. It was not until they had emptied their revolvers into him that he was killed. They report that he measured the enormous size of eleven feet seven inches from tip to tip of his wings, and this can readily be believed as they showed photographs of the wings alone that are over five feet long.

A few days following that on which the account of the killing of the condor appeared, the secretary of the California Audubon Society announced that, as the law of the state protects the bird, and makes it a misdemeanor to have possession of even a part of one, he should institute suit against the men who did the slaying of this rare bird. It is to be hoped the suit will be successful, as there seems to be no other way of putting a stop to the needless killing of birds and animals by those who, having a gun, feel they must shoot and kill some living thing, no matter how useful or harmless.

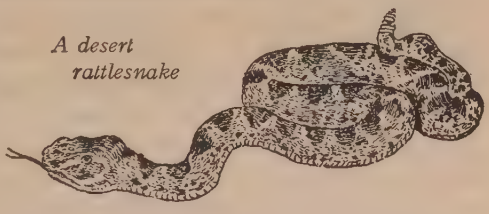
A quiet and cool retreat in Andreas Canyon

CHAPTER XIII

Reptiles and Insects of the Desert

REPTILIAN life on the desert is peculiarly abundant and interesting. The various forms of rattlesnake, the large family of lizards, the chuckwalla, the Gila monster, the desert tortoise, are all of singular interest to me.

To those who are able to put aside their fears and inherited prejudices there is wonderful fascination in the beauty, and the grace of movement of the rattlesnake. The delicate colors and the exquisite way in which nature tints the diamonds — the soft grays and olives and browns and salmon reds — cannot help but appeal to all true lovers of color harmony. And the grace of movement, the easy, noiseless, undulating elegance of motion are unsurpassed by anything save an eagle in its soaring.



A desert rattlesnake

The diamond-backed rattlesnake (*Crotalus ruber*, Cope) is common on the desert. Friends of mine have caught several near Mecca. Of two specimens before me as I now write, one is a rich reddish cinnamon, variegated in exquisite shades. Down the center of the back from head to within two inches of its rattle is a row of diamonds, irregular enough to give one the sense of real life as opposed to something made with the uniform and monotonous regularity of a machine. The diamond is composed of a dark blotch, edged around with markings that are nearly black, and separated from each other by other edges of light cinnamon. The diamonds are more distinct and clear

from the head of the reptile to about three-fourths of its length, where they begin to shade off and become less emphatic. The gastrosteges, or belly scales, are almost white.

The wife of one of Chicago's distinguished clergymen so fully appreciates the beauty of the diamond rattlesnake that she is able to cast aside all feminine antipathy to the reptile and use its beautiful skin as an adornment for insertion in a dress waist.

The other rattler has a skin of grayish brown, a little less attractive in color than the former one, but equally beautiful in form and general effect. Its length is four feet one inch. It has thirty-one diamonds from head to rattle.

The Moravian missionary at Martinez has had several experiences with rattlesnakes. They are nothing out of the common, and they serve to illustrate the possibilities in several years of desert experience. He was driving along one evening just at dusk, when his horse stopped and refused to go farther. The road was in the village and fenced in, therefore he could not make a detour, so, jumping out of the buggy, the minister ran ahead to see what was the matter. Suspecting the cause he went cautiously and there found a long big rattlesnake stretched across the road. To kill it was the work of a minute, and, after beheading it to make sure, he returned to his buggy and drove on.

On another occasion, one afternoon in the summer of 1905, he had left his buggy in the yard. After supper he went out to put it into the shed. I should here explain that my friend is quite deaf and would be unable to hear a rattlesnake unless he were very attentive and quite close. As he picked up the shafts and started off, his wife, who by mere accident came out after him, heard a rattlesnake. Though she called out he paid no attention, went on, put away the buggy and returned. Next morning, hearing his dog barking at some object on the lawn, he went out and found the snake, wounded, and barely able to move. He had either trodden upon it or the buggy had gone over it, and thus injured it. He killed it and measuring it found it four feet and three inches in length.

About two years ago he was going out to picket his horse behind the barn, when, suddenly, he came upon a rattler, coiled

up, watching at a gopher's hole. He was walking quickly and being unable to stop stepped right over the snake. As soon as the horse was attended to, he returned to the spot and found the snake still there, undisturbed by his passing over it. To get a hoe and kill it did not take long. The snake was so intent in watching for his supper, — waiting for the coming out of the gopher, — that the movement of the man had not frightened him or driven him away.

The first year of his ministry to the Indians his wife utilized a box placed on end with shelves inside it for a kitchen cupboard. One day she dropped a knife behind the box, and after failing to reach it, asked her husband to do so. He removed the box and there, as well as the knife, he found a rattlesnake coiled but apparently not angry, for it neither rattled nor made any hostile movement. Of course it was speedily killed.

Tiger rattlesnake

I have killed many diamond-backed rattlesnakes on the desert. In March, 1906, as my companion and I passed through the Hayfields, in Crawford Valley (a place where, some years, gallena grass grows in great quantity), a large rattlesnake called our attention to his presence on the right-hand side of the road. There was not a stone in sight, and the only stick at hand was the stock of our rude riding-whip. Making a weapon of the handle, I struck the snake on the head, stunned him, and then cut off his head. My companion, who had had no experience with snakes, was horrified at the muscular contractions of the headless creature and was really afraid for me when, with startling force, the headless reptile made what seemed to be a vicious and well-aimed strike at me. I skinned the body, and, though skinless, tailless, and headless, the body was still writhing and occasionally making the quick muscular dart forward of its strike when we left it.

The flesh was white and clean and easily gives color to the statement made by many people that they have eaten the flesh of a rattlesnake. They say it is tender and sweet and far preferable to chicken. That may be so, — there is no accounting for

taste. Personally I prefer chicken, especially if it is of the yellow-legged variety.

When measured this snake was found to be four feet six inches long. His color was a variegated brown of a beauty impossible to describe. I never see the beauty of a dangerous reptile such as a rattlesnake, a Gila monster, a cobra, but I am led to the reflection, "Why waste so much beauty on a creature so repulsive to the major portion of mankind?" Possibly man was not considered in the distribution of beauty among the objects of nature. He himself is one of the objects, instead of being an outsider, a superior creation.

This rattler had thirty-five diamonds on his back of a peculiar, irregular, dark brown, with the diamonds in a deeper color, lined or edged with scales tipped with creamy brown. In some cases this edging is very indistinct, indeed almost absent on the head end of the diamonds, but very clear on the tail end. At the tail there is a half-circle of ashy color with four alternate quarter-circles, then one more half-circle and the rattles, of which nine were still on when the skin was dressed.

A traveling rattlesnake

Some six or seven years ago a rattler of this same species was found in this same locality — the Hayfields — which measured over six feet in length, and over a foot in circumference at the thickest part of his body. The specimen I killed must have been a relative, for I have seldom seen a snake of this kind with so thick a body.

The horned rattlesnake, or sidewinder, as it is commonly called (*Crotalus cerastes*, Hallowell), is well known on the desert. I have found it north, south, east, and west. At Palm Springs I came upon a family of five at one time. They all came to an inglorious end under a huge rock. In the Eagle Mountain valley I killed one, and later my companion also killed one. A few days later I ran upon one in the dry wash coming down between the Chocolate and Chuckwalla ranges. The latter escaped into

a dense pile of washed-down brush, but I set fire to it and hope he was burned. For of all the rattlesnake family I find this is the most dreaded. I suppose it is because it is quicker in its movements and its side motion makes it more uncertain where and how it will strike.

It is much smaller than the ordinary rattler and is peculiar because of the horns which rise over each eye. These horns are the superocular scales which assume this shape. It is more marked, however, because of its strange side-winding motion. Instead of the straightforward progression of the ordinary snake it makes a strange twist to the right, and thus moves forward sideways, making a track upon the sand almost the shape of the letter S. At the head and tail of the letter a deeper depression is made, clearly showing that the snake rests first its head, then its tail in these depressions, giving its whole body a lift forward as it does so. Though it will fight if compelled, it is less aggressive than the ordinary rattler, and will always escape if it possibly can. It lives upon the rats, mice, chipmunks, and lizards of the region.

At the end of April I have often found them in pairs, and it is probable that this is the mating season, though I am not able to determine their sex. I do know, however, that they follow each other as most mating creatures do, and are so interested and preoccupied as to forget to retire to their usual holes or shelter during the night. The result is we have often found and killed them in the cold mornings when they were too chilled to be able to move.

All the sidewinders I have seen have had a peculiarly beautiful color, which reminds me somewhat of a bright new rug of soft colors and shades. The one I have before me now as I write has a body of pleasing gray, with a series of spots down the back of a very much toned-down salmon-red, and a corresponding series on each side, near to the belly, of almost black spots. Over the whole body are scattered minute grayish spots as if it had been sprinkled with an air-brush.

For years it has been a common delusion that a rattlesnake could not strike unless coiled. This is utter nonsense. A rattler can *bite* when at full length, when moving, or, as I once

found to my pain and narrow escape from death, when held securely in one's hands. When coiled he has the power of springing to more than half his own length, and his speed and accuracy of aim make him much to be dreaded at such times, though his aim is not always certain. When uncoiled he can also spring half his length, and has the wicked art of swinging in a semicircle when one least expects him. Even with his back broken he can strike, and when apparently dead should be approached with caution. I have known dangerous wounds inflicted by a "dead" snake, when an attempt was made to cut off his rattles. The muscular contraction caused by the incision of the knife made the apparently dead reptile swing around and give a bad blow and bite, for, as a rule, it should be remembered that the snake's action is not a "bite," pure and simple, but is a combination of blow and bite so rapidly delivered that it is difficult, if not impossible, for the unaided eye to follow the various movements composing it. With a rattlesnake held in my hand, and watching every movement with keen and trained eyes, I found it impossible to recognize the processes. And yet the snake can bite, as we usually understand the word. I have seen it force its fangs through a half-inch of flesh with no other motion than the bringing together of its jaws. Such a bite is possibly more dangerous, too, than the ordinary strike, for in a deliberate bite the fangs penetrate and the poison is injected more deeply than in a sudden blow.

Sidewinder

Another popular delusion is that the forked tongue of the snake is its dangerous "sting." The tongue of a rattlesnake is as harmless as that of a dog. Why the snake darts it back and forth, and why it is forked, and why it looks so wicked and vicious at such times I do not know. The fixed, steady glare of the eyes has a hypnotizing effect upon most people, and adds to that sense of conscious wickedness most people believe inheres to the rattlesnake.

Still a worse and more dangerous delusion is that whisky is

the best "antidote" for snake poison. The following of this delusion has slain far more snake-bitten people than have been poisoned. Let it be clearly understood that whisky, save in doses of a teaspoonful every half-hour, is a most dangerous "remedy" for snake-bite. It kills many a person who would have recovered if nothing had been done. Leonard Stejneger, the government expert upon this subject, emphatically says: "It cannot be emphasized too much, or too often, that intoxication" (alcoholic), "so far from helping the cure, helps the poison, and that persons having been made intoxicated beyond excitement, when under treatment for snake-bite, and yet recovered, have so recovered not from the treatment but in spite of it. It should also be remembered that the alcohol has no beneficent direct action upon the venom; on the contrary, applied locally or intravenously, it seems to add to the virulence of the poison."

Open mouth of sidewinder

It will doubtless prove interesting to the generality of readers to know accurately the "how" of the rattlesnake's venomous bite. The fangs are hinged to the upper jaw, and are covered with a sheath, somewhat after the fashion of a cat's claw. Each fang is a large and curved tooth terminating in a sharp point. Near its root it is grooved, or slit, then the edges of the slit close and it becomes a canal, to open again into the groove near the pointed tip. When the snake wishes to strike, the fangs are unhinged downward, after the mouth is very widely opened. The two actions are not dependent upon each other, as the mouth is often opened and the fangs remain sheathed. For while at rest they are enclosed in a muscular sheath, which drops back into folds at the base when the tooth is in active service. The elevation of the fangs is a voluntary action on the part of the snake, and it is sometimes done with a deliberation that is as lazy and slow as the action of a sleepy cat.

In striking from the coil the rattler is not to be supposed completely coiled. The neck and upper part of the trunk are not thrown into circles, but lie in two or three curves or folds across

the mass of the coiled body, with the head raised three or four inches. Out of its mouth darts the forked tongue, an invariable sign of irritation and anger. The end of the tail is generally either elevated a little from the center of the coil or on one side, and is projected far enough away to allow of its vibrating with freedom and speed. The noise is one to be readily recognized by those who have never heard it, and never forgotten by those to whom it is familiar.

With a dart forward that is lightning-like in its rapidity, the snake strikes its object, and as the teeth or fangs enter the flesh several muscular movements take place almost simultaneously. The body of the snake acts as an anchor, while a neck contraction draws the head back so as to force the fangs in deeper. At the same time certain other muscles draw the points violently backward, and this sinks them deeper still. Immediately, or simultaneously, the lower jaw, with its pointed teeth, closes upon the object, and this results in the farther deepening of the wound and in the injection of the poison. If the object be large and flat, so that the lower jaw cannot get under the object, this last action is considerably minified, though the ejection of the poison takes place.

According to Dr. Weir Mitchell the muscles that help draw up the lower jaw are so folded about the poison gland that it is simultaneously squeezed and the poison is thus forced into the duct leading to the fang. This would make the ejaculation of the poison involuntary on the part of the snake, though elsewhere the learned doctor explains fully his discovery of a sphincter muscle which, by its contraction, closes the duct, so that, although there is muscular pressure upon the gland, the snake, at will, can close the sphincter and thus prevent the ejaculation of the poison. My own observations have confirmed this, as in my own case when bitten, though both fangs penetrated my thumb, the right poison gland only was evacuated, and I afterward forcibly compelled the ejaculation of the poison from the left gland.

The connection between the gland, the duct, and the fang will be clear from the accompanying diagram. But it should be remembered that the fang, when closed and sheathed, has no

connection with the duct. It is only when the fang is raised that the two come together, and should there be any misplacement of any kind, the poison escapes through the opening of the duct and fails to enter the fang. This fact explains what many have noted but failed to understand, viz., that sometimes there is a large amount of the venom spilled outside the wound made by the fang.

The growth of the fangs is a remarkable provision of nature. Behind the fang in service are a number of subsidiary or reserve fangs, the one nearest to the active fang being thrust forward when required to take its place. If it be lost or shed it is speedily replaced (within a few days), but if broken or violently displaced it requires several weeks. There are from eight to ten of these reserve fangs in all stages of growth, from tiny ones that appear as mere points.

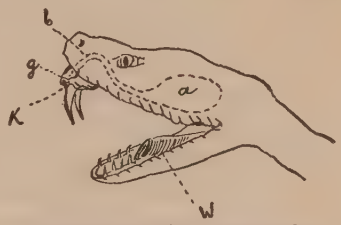


Diagram showing rattlesnake's fangs and poison glands

The poison glands are at the rear of the base of the fangs, behind the eyes, on the sides of the upper jaw. In shape the gland is a flattened, almond-shaped oval, the rear end being well rounded, and the front end tapering to the duct, which begins just behind and below the eyeball.

The mouth glands of reptiles are more specialized than the mouth glands of amphibia. This is clearly shown, not only by the fact that they are separated into distinct groups, but by the greater complexity of the individual elements of the glands. The poison gland of the rattlesnake is a modified form of a part of the upper labial gland. This gland has no well-defined homologue in the mouth of the mammal, though a number of small glands occupy nearly the same position, and have a similar structure. It would be interesting and instructive if we could trace out, step by step, the modifying processes, and understand the conditions that caused the modifications from a harmless labial gland to a poison-secreting gland.

It would seem that it ought not to be necessary, at this day and date, to have to smite another popular illusion about the

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rattlesnake. Yet as I am constantly meeting with it in daily life I will refer to it in these pages. It is a popular belief that the number of rattles denotes the age of the snake, there being one rattle or bone for each year. This is utter nonsense. I have found large and old rattlers with but two or three joints, for the rattle is a most delicate instrument, easily broken or injured. The fact is the joints grow at the rate of from two to four each year. One careful observer who reared some snakes in natural conditions found that the joints corresponded with the exuviation (or skin-shedding) of the reptile, and that of two snakes one, at the end of sixteen months, had six joints, and the other seven, though the latter, at one of the exuviations, lost three of the joints. Hence, though both of the same age (sixteen months), one had four joints and the other six, and none but the observer would have known that the four-jointed rattle reptile had lost three of his joints.

There has been much discussion as to the real purpose of the rattle, and scientists have not yet come to any unanimous conclusion. As far as the relation of man is concerned the rattle is a decided disadvantage to the reptile. But, of course, the rattle was evolved long before man appeared upon the scene. It has been suggested that the object of the rattle is to decoy insect-eating birds into the range of the rattler's spring, because even man often mistakes the call of the locust (*Cicada rimosa*, Gay) for the rattle. But how about the facts that rattlesnakes eat comparatively few birds, and that birds in hunting insects seem to rely far more upon their sight than the sounds they hear?

Other learned professors contend that it is for the purpose of attracting the sexes together at mating time, and it has been observed that during a fight with hogs other snakes responded to the rattling of the reptiles that were attacked.

Still another suggests that it may be for the purpose of paralyzing the snake's prey with the sound, but experience demonstrates that animals and birds alike hear it and are both unconscious and unafraid, unless in the very presence of the reptile.

A suggestion that finds much favor is that the rattle is a noise of warning, and therefore part of the defensive armament of the reptile, suggesting to the outsider that the poisonous creature is alert, aware of his presence, and ready to defend himself.

Herbert Spencer believed that the rattling of the snake's tail is like the wagging of a dog's tail, an escape of nervous force which can find no other ready mode of manifestation at the time.

All these theories are interesting and it may be there is a modicum of truth in each of them.

The most practical thing of all, however, is to know how to treat a snake-bite, should one be unfortunate enough to be bitten. Much depends upon the dangerousness of the bite, viz., the depth of the wound, the amount of poison ejected into it, and, of greater importance still, the location of the wound.

Ordinarily few snake-bites reach the veins, hence the action of the poison is slow, and the bitten person need have no fear. The first thing to do is to tie a strong ligature or two between the wound and the heart, wherever practicable. A broad, flat band is better than a string which cuts into the flesh. Tighten this band by twisting it with a stick. This band should be released *for a moment or two* every ten minutes to allow a trifle more of the poison to be absorbed by the system. Now cut with a pocket knife as deeply into the flesh as the snake punctures have gone and make the blood flow freely. Suck out the blood from the wound. This is perfectly harmless unless the person doing it has abrasions of the skin on lips, tongue, or mouth. Now administer a teaspoonful of whisky, *not more*, every fifteen minutes, and get your patient to a doctor as quickly as possible.

There are remedies, however, that one can carry in his vest pocket, and that are as easy to apply as the foregoing directions are to follow. I have had a small case prepared, accompanying which is a small pamphlet giving full particulars of how to use the remedies.

As a rule a horse is afraid of a rattlesnake, especially if it has been bitten. Two lady friends of mine were driving over the desert, and they suddenly came upon a rattler sunning itself in the road. As the horse approached his snakeship drew himself up into a coil, and lifted both his head and his rattle in warning, darting his forked tongue to and fro. The horse, immediately he heard the rattle, backed off, and the ladies, not knowing what was the matter, sought to urge him forward, even using the whip for the purpose. But the horse knew best, and, for-

tunately, the desert being free from gullies, he was soon out of danger, and, making a respectful detour, continued his journey.

The Gila monster (*Heloderma suspectum*, Cope) is seldom seen on the Colorado Desert, though in twenty years I have seen three or four. This is a large, heavily built lizard, from a foot to two feet in length, with short limbs and tail, and entirely distinct from any other lizard of the region, both in its size and stockiness of build. It and the rattlesnake are the only two dangerous or poisonous reptiles of the desert.

Many desert people will tell you that the heloderma has no poison glands and that, therefore, his bite is not dangerous. This error doubtless arises from the fact that there are well-authenticated cases of his bite that have caused nothing more than a slight inconvenience. But it is a most dangerous error. The venom of the heloderma is as poisonous as that of the rattle-

Gila monster

snake, as several people who have been bitten have found out to their cost. For many years I have been investigating this subject and I will make quite clear why some people are bitten by the heloderma without injury and others suffer severely.

The venom glands are situated under the chin — thus being on the lower jaw, instead of the upper, as in the case of the rattlesnake. "They are modified from glands which correspond to the sublingual glands of mammals. There are four ducts leading out of each gland. These ducts perforate the lower jaw and open in front of the grooved teeth. A careful study of the dentition of the heloderma shows that there are several intermediate forms between the unmodified teeth of the reptile and the fully developed poison fangs. The poison glands are compound tubular glands, closely resembling the other salivary glands in structure. The peculiarity of their secretion is to be explained by their physiological activity rather than by their structure." So writes my friend, Dr. C. A. Whiting of the

Pacific College of Osteopathy, who has given some time to the study of the teeth and glands of the heloderma. Though their poison teeth are grooved, there is no direct connection between the poison glands and the teeth, as in the case of the duct of the rattlesnake. The poison flows out onto the floor of the mouth, between the lips and the gums, that is, into the interior of the bottom jaw. Being below the teeth and not directly communicated to them, the poison sometimes fails to find its way into a wound. The saliva of the upper jaw is perfectly harmless, as is also the same saliva in the lower jaw. But it must not be forgotten that there is also a deadly venom in the lower jaw, which gets mixed with the saliva.

As a rule the Gila monster is lazy and sluggish, and one might play with him for hours and keep him as a pet for years and never see any sign of anger. But let him be angered and then he is dangerous. And the real danger comes when, as he bites, *he turns over*. With a vicious lunge he seizes the object and at the same moment turns over with lightning-like rapidity. He can hold on with the tenacity of a bulldog or he can bite so quickly that he "snips" a piece of flesh out easier than one would pinch off a piece of a cracker. I have seen this action a hundred times, and this is what one must beware of. When the reptile thus bites, holds on, and *turns over* the danger of the case is as great as the most dangerous bite of a rattlesnake, for in this position, if the poison glands are active, the saliva and poison commingle and flow freely into the teeth and thus into the wound. As will be seen in my comments upon the chuckwalla, this "turning over" is a habit of the latter reptile. Yet the chuckwalla has no poison glands. There seems, however, to be a relationship in this peculiar habit, which, as far as I know, is confined to these two reptilian inhabitants of the desert. How strange and singular the provisions of Nature for the protection of her various children!

With the chuckwalla the rapid turning over seems to be to give added purchase in biting its enemies or prey. The questions that arise are: Is the turning over of the heloderma for the purpose of rendering effective the working of its poison apparatus? If so, what is the reason of the turning over of the chuck-

walla? Is it a survival of a useless and unnecessary habit in the chuckwalla, seeing that it has no poison to distribute, or is the development of the poison glands in the heloderma a later evolution, while the chuckwalla has evolved in a different line?

The treatment for the bite of the heloderma is the same as that for the bite of the rattlesnake.

In a wild state the heloderma lives largely on birds' eggs, young rabbits, and though apparently so clumsy and slow is an expert bush climber. I have seen him perched high on a mesquite and have been considerably startled at his presence. His five-toed "hands and feet" are well adapted to climbing, which he does both easily and gracefully. Certain specimens that have been in captivity are thus referred to by Professor R. L. Ditmars, their curator at the Bronx Zoölogical Park: "The Gila

Chuckwalla

monster may be placed under the head of omnivorous lizards, as in captivity it feeds almost exclusively upon eggs — the food which most certainly cannot form a large proportion of its nourishment in a wild state. Our captive specimens never have been induced to take other food than eggs, either boiled or raw, the latter sometimes mixed with chopped meat. Unless mixed with eggs they will not eat meat. With stolid indifference they refuse morsels that are dear to the ordinary reptile of their size, such as very young rodents, large grubs, and meal worms. Ants and their eggs are said to furnish a large proportion of this reptile's food, but all the specimens under the writer's observation have refused them. They have lived with us for four years, and have thrived upon their simple and unvarying diet."

In referring to the changes noticed in the actions of captive animals when placed outside and under the influence of the

outer air, sunshine and natural surroundings, Professor Ditmars thus writes of the heloderma: "The most interesting demonstration of this mental change has been in connection with specimens of the venomous Gila monster. In their cages these lizards are the personification of good nature, permitting themselves to be handled in the most unceremonious manner, without the least show of bad temper. Removed to a sand-pile heated to a high temperature under a bright sun, and left for a few minutes, they become different creatures. They will snap viciously from side to side, and resent the least intimation of interference with sharp hisses as they lie open-mouthed, awaiting an opportunity to close with bulldog tenacity upon an offending object. On several occasions when endeavoring to extract poison from these lizards, the writer has been unable to provoke them to bite, but after giving them a sun-bath for a few moments had considerable difficulty in disengaging their jaws from the glass vessel in which the fluid was collected, although the temperature of the outside air and sunlight which had aroused such hostility differed but slightly from the warm air of their indoor cages."

The heloderma is a strictly oviparous lizard. A captive specimen, measuring nineteen and a half inches, deposited four eggs, each two and three-quarters inches long, and one and a half inches in diameter. The eggs were covered with a leathery integument, but, though fertile, the conditions for development were adverse, as, in spite of every known precaution, they shriveled up and their contents solidified.

Few people, save experts, have any idea as to the number and variety of the lizards found even in the limited area of the desert. Van Denburgh names and describes a large number that are found either on the desert proper, in the passes leading into it, or on the surrounding mountains.

All of these species have habits, anatomy, and markings peculiarly their own, which would require far more space than I can afford merely to enumerate. The following general descriptions, with a few specific details of individual species, cannot fail to prove interesting.

Especially would I commend to students of art in form the

markings on the bodies of some of these reptiles. Of their kind there is nothing more beautiful in creation than the markings on the skin of some rattlesnakes and lizards. Nature seems to have provided for every esthetic need of man. Designers for dress patterns, wall-papers, even table-cloths can find suggestions innumerable in these markings; nay, many of them are all ready to be bodily transferred, with such modifications of color as their new uses may suggest, into commercial forms of surpassing beauty. Take, for instance, the markings on the body of the silvery footless lizard, and those of the diamond-backed rattlesnake.

The chuckwalla is the best known of the larger lizards of the desert. It is sometimes known as the Alderman lizard, though its scientific name is *Sauromalus ater*, Daméril. This is one of the most interesting creatures of the desert.

Chuckwalla

The chuckwalla has a body something like that of a toad, flat and squat, about three and a half inches across, with a thick stubby neck, and the head of a lizard. Its head is about eight inches long. The complete length of one specimen that I measured was thirteen and a half inches long, divided as follows: head, one and a quarter inches; neck, three-quarters of an inch; body, four and one-quarter inches, and tail, seven and one-quarter inches. His body was beautifully mottled or spotted, mainly a dark reddish brown, with small spots of orange and cream. The tail was of light gray or cream, and with armored rings. The whole appearance of the body covering was almost that of fine and rich beadwork, the beads being exceedingly small and symmetrically arranged. They were in perfect rows, and the size of the bead (which in reality is a scale) grows smaller the farther away it is from the spine. On stroking the body it felt like a hard-napped velvet, so smooth and fine were the scales, but upon stroking it the other way, or towards the head, it had

a rough and wood-fiber feeling. The color under his stomach was the same as on the upper part of the body, save that it was a little darker.

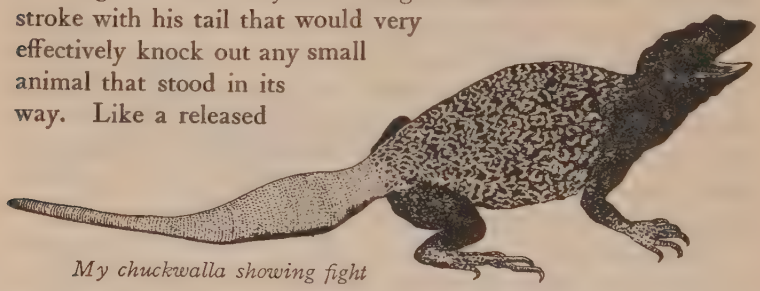
The various specimens of the chuckwalla show great variations in color and in the bands on the tail. The specimen I have before me now has no bands whatever. Van Denburgh says "these may be present or absent in the same individual at different times, and the change seems to be, at least to some extent, directly under the control of the animal."

When my specimen was caught he made show of fight, opening his mouth either in anger or fear, and showing his two rows of saw teeth, that looked almost like very small fish-bones. In the hands the chuckwalla readily subsides and seems thoroughly to enjoy being stroked and petted, especially on the head. He closes his eyes, as if in perfect content, and makes no attempt to escape. The ears have almost the appearance of attenuated fish-gills, and the five fingers of the four feet are a singular combination of bird and monkey claw. When frightened the chuckwalla exhales so that his sides suddenly cave in and then the skin wrinkles up like the face of a very old Indian.

The chuckwalla is doubtless harmless as far as venom is concerned, as the scientists assert, but when angered he is quite vicious, both with tail and mouth. His teeth, however, are not very marked. They are like those of a fish, but his grip with his jaw is strong. He also, like the Gila monster, has a habit of expelling the breath, scarcely a hiss, which is an indication of anger or fear. When he bites viciously he turns completely over, and if the substance he bites is of a yielding nature I have seen him turn with such force as to roll over three or four times. As I write a captive chuckwalla, tied by a string, is at my feet. On poking my pencil at him he bit it so viciously as to cut off the point (with some of the wood), and then, when I shook a paper before him, he suddenly bit that and rolled over three times, so as to completely envelop himself as in a paper wrapper. He coiled the string around his body several times, and I had to turn him back again or cut the string in order to release him.

The Chuckwalla Mountains receive their name from the fact that large numbers are found there. In fact, in all the mountains

between the Salton Basin and the Mohave Desert the chuckwalla is abundant. He loves the rugged, creviced rocks. Here he can lie and bask in the hot sun to his heart's content, and here, in the crevices, he finds shelter and home. The buds and blossoms, leaves and young shoots of the creosote bush give him abundant food, and in the spring at any rate, when the rains have made every plant flourish, he is evidently happy, contented, and well fed. He is a somewhat shy creature, averse to being watched too closely, though somewhat sluggish in his movements, and by no means aggressive when attacked. He slides into a near-by crack or crevice, and lies there as if hoping you will speedily go away and leave him. If you can reach him with a stick and touch his hind legs, he has a way of striking a vicious side-stroke with his tail that would very effectively knock out any small animal that stood in its way. Like a released



My chuckwalla showing fight

spring it strikes "thud," and the tail being covered with a hard armor, the blow is not to be despised.

If you force him to a further retreat he will seek to penetrate to an extremely narrow crack where you cannot possibly reach him. He has powers of compression that are remarkable. But if while in this position you can seize his tail, and think that thereby you have him, you are destined to find out your error. You pull, and pull, and continue to pull, and if your strength surpasses your knowledge you will pull a portion of the poor creature's tail off, but you will make no progress in removing him from his retreat. For a long time I could not see what it was that gave him such a tenacious hold. His claws did not seem strong enough, and on several occasions I was able to pry up the rear legs so that there was no holding power in them, and yet the reptile held on. At last I discovered that when he was entrapped

in this manner he fills his lungs to their utmost capacity. This pushes his body, both belly and back, close to the rocks above and below, and the rough surface of his body then gives him a sure hold upon the rocks. When he is thus wedged in, and it is possible to get at his head or nose, a few prods will cause him to exhale. Then he backs or sidles out as easily as can be, though before you may have thought the crevice so small that he was wedged in and could never escape.

I am not sure but that it is a fiction that it does not hurt a chuckwalla to pull off his tail. I saw two one day, the first of which had lost over an inch and a half of his tail. The other had his full complement. I followed the latter one to his hiding-place, where he showed no fight, but tried to get farther from me in the narrow cleavage of the rock. I caught his tail and pulled. About an inch came off. At that point there was no blood, but a full inch higher up a little blood oozed from between the joints of his armor, and therefore I am inclined to think a wound was caused which produced pain. When I tried to make him show fight by prodding him in front he made no effort to escape, but opened his mouth and seized the brass end of my pencil so that it required a sharp jerk to remove it. There was also a slight frothing at the mouth.

The Indians of the desert, who still live in a somewhat wilder condition than their brothers of the settlements, regard the chuckwalla highly as an article of diet. They waste no time in dressing them, but throw the whole reptile, skin, tail, and all, into the stew pot. The eater of frogs' legs can readily believe what others may rather doubt, that the chuckwalla, properly prepared, is a dish for an epicure. Especially after the spring rains his flesh is white, sweet, and tender, and is not unlike the dainty flesh of the frog's leg.

In our various peregrinations my assistants and I have often seen the chuckwalla climb the greasewood and creosote bushes and eat the young buds. Various dissections have convinced me that he is, as a rule, a strict vegetarian, and I can vouch for the rich delicacy of his flesh. It is white, sweet, tender, and juicy.

Few people, looking at the lizards as they dart to and fro in the sunlight, see any similarity between them and the birds.

Yet all our leading scientists tell us that birds and lizards are so closely allied, share so many and important structural characteristics that they are united in one group — the vertebrates, or animals with a backbone. So careful a scientist as Huxley declares that the chief or most positive difference between reptiles and birds as we know them to-day is in the matter of feathers.

In other words, the bird is but a reptile covered with feathers. Yet, to our unaided eyes, how wide the gap seems, and what a reflection it is upon our so-called "instinctive feelings." We shudder with horror and disgust at the sight of a lizard, while we exclaim with rapture at the sight of a bird.

Yet to the unprejudiced eye — and I think mine is one — the beauty of the lizard does not suffer in comparison with the beauty of the bird. The colorings and markings of the one are as exquisite and perfect in their way as are the feathers and colorings of

Burnett's alligator lizard

the other. And while nothing can be compared with the graceful flight of the bird, it cannot be denied that the graceful and easily fluent motion of the lizard is a matter of wonder and delight to the observer.

Birds have peculiar breathing powers, owing to the hollowness of their body structure. Lizards, too, have the power of breathing when buried in hot sand. Birds molt their feathers at stated times, and so do most reptiles, the only difference being that the feathers of the birds come out one by one, while the scales of the reptile, with the entire skin that holds them, come off at one and the same time. We are all familiar with the shedding of the skin of the snake. The reptiles do the same, yet few of us have realized that these two apparently dissimilar operations are practically one and the same thing. And while the shedding of the bird's tail may not seem to have anything to do with the ease with

which one can pull off the tail of a lizard, it is a remarkable fact that both bird and lizard have the power to grow a new tail in about three weeks when the conditions are favorable.

The eggs, too, of the lizard are exactly the same as those of the bird, save that the latter have a lining shell, while the former have only a thick, membranous integument. The lizards lay their eggs in the warm, moist earth, never in dry sand if they can find the moisture, and leave them for the sun to mother.

When they are small how puny, cunning, and interesting they are! How curious they are! If curiosity is preëminently a human trait it is one that has descended from a long line of ancestors, beginning with the lizard, for as soon as he sees anything strange he first squats down, as if to hide, and then, overcoming his fear, he must see what goes on. Stretching his legs to the utmost, he rises, as it were, on tiptoes, cranes his neck, looks intently and at the slightest movement squats down again with great rapidity, to repeat the stretching and peeking as soon as he thinks it is safe.

Small desert sand lizard

One seldom sees lizards out early in the morning. They love the warmth, and wait until the sun has risen. I think I never saw one, except in a very exposed place, until after seven o'clock in the morning.

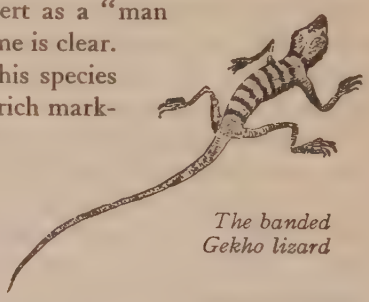
The desert whiptail, commonly called the snake-lizard (*Cnemidophorus tigris*, Baird and Girard), is a long, beautifully colored, and graceful creature, that is not unlike a snake, with four legs added as an afterthought. The body is a rich, old gold green, the head almost black and spotted with a greenish bronze. He waddles along in a slow and deliberate manner, over, under, and around the rocks, seeking his food, but when scared or pursuing an insect he can dart with great rapidity. I have seen one leap a distance of two feet with perfect ease.

One very interesting lizard is the desert night lizard (*Xantusia vigilis*, Baird), quite a number of which are found in the region of the Devil's Garden, northwest of the San Gorgonio Pass. This peculiar lizard seems to love the tree yuccas and is found in quantities in the dried trees, stems, and branches that are rotting

on the ground. In catching them one has to be quick and expert or they waddle away with fair speed, and invariably aim to get under one's shoes or even up one's legs. They possess the power in a marked degree so common to many of their class, not only of adapting their color somewhat to the soil of their habitat, but of becoming lighter colored when exposed to the light of day. As night approaches they turn dark again. These changes take but a few minutes to accomplish.

This species of lizard is ovoviviparous, giving birth to fully developed offspring, as many as three having been known to be born at one time.

The most beautiful lizard I have ever seen I caught on the Colorado Desert in 1906. It is the leopard lizard (*Crotaphytus wislizenii*, Baird and Girard), and is known to the miners and teamsters of the desert as a "man eater." The reason for this name is clear. The markings on the back of this species of lizard are all suggestive of the rich markings of the man-eating leopards or tigers of India.



The banded Gekho lizard

This little creature had lost part of her tail before I caught her. She was very swift and I had a long chase before she was captured. Her body is a rich brownish cream, with markings of a purplish black. Irregular lines occur in this beautiful black that yet preserve a certain conformity and appear the same on each side of the center line. The design of these lines is made up of small dots, no two alike, in the approximate center of which a tiny speck of black and red surrounded by infinitesimal specks of variegated color or tint occurs. Sloping down on each side of the body to the hind legs she has a greenish tinge, and the whole body, from head to tail, is iridescent and exquisite beyond the power of words to describe. The "texture" of the body is as fine as velvet to the softest touch, and the tiny creature seems to enjoy being stroked and caressed. I had to carry her nine miles in my hands as I walked in the hot sun, and every once in a while she made a vigorous struggle to escape, as a cat held on one's

lap will, but there was no viciousness or attempt to bite. Once when I was writing she was at my left hand on the desk, her forelegs stretched up to their longest capacity and her head on one side peeking at me with the greatest curiosity. To keep her out of the reach of possible dogs or cats I placed her on the top of a polished bookcase. But it was very uncomfortable for her, for she could not travel on a smooth surface. Her legs worked with great rapidity and she struggled to escape with an effort that was pathetic, and yet it was all in vain. She scarcely moved a half an inch as the result of all her efforts.

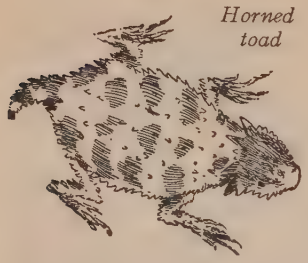
I brought her home with me in a box containing a chuckwalla, and barely had time to unpack them one morning before hurrying to catch a train. In the haste the lizard could not be seen, but soon afterward my daughter found her, and, not knowing what to do with her, telephoned to Mrs. Elizabeth Grinnell, the well-known student and authority on birds and lizards. She replied that the best thing was to put the little creature in a box or other receptacle, with plenty of sand on the bottom. As no box was handy a round zinc wash-tub was found, with sides a trifle over a foot high. Dry sandy earth was put on the bottom and the lizard duly installed. For food "sow bugs"—as they are called—were hunted for, but she despised and studiously rejected them, while live flies were eaten up by the half-dozen. When thirsty, it was both interesting and comical to see the little creature lift up and throw back her head, and stretch her forelegs as if trying to turn a back somersault, and then eagerly lick with the tongue the drop of water held on the extended finger.

Horned toad

In the house she became very slow and torpid and evidently glad to be handled, and so every once in a while I would take her out of her tub and hold her in my hands. The mornings being cool we invariably heated a rock for her, and then she stretched out at full length on it and enjoyed the warmth to the full. In the middle of the day when I could so place her tub as to catch the direct rays of the sun she became very active and would run around and try to jump out of her place of confine-

ment. I have watched her for half an hour at a time, after the sand was thoroughly warmed, trying to leap out. Stretching up eagerly from the highest part of the sand, she would look toward the edge of the tub, gather herself together and make a leap. It was a trifle too high, however, for her to escape, though a few times her claws caught upon the rim and she was able to pull herself over.

When wearied in the daytime or when ready to go to rest at night she buried herself in the sand. For this purpose her nose was well adapted. It is of a peculiarly rounded form, flat underneath and somewhat shovel-formed above. Her use of this shovel-shaped nose became very apparent as we watched her burying herself in the sand. Drawing back, as if for a veritable dive into deep water, she plunged forward with a quick, decisive motion, wriggling her nose into the sand as she pushed herself forward. Much quicker than I can write it, she completely covered her body, where she lay squat and still until ready to come out again.



Horned toad

With great regret I parted with my pet and committed her to the careful keeping of Professor Ditmars, who now has her safe, I hope, in the Zoölogical Park at the Bronx, New York.

The horned toad is another of the peculiar denizens of the desert, though by no means confined to it. I have found several varieties of the horned toad on the Colorado Desert, chief of which is the one named after the desert (*Phrynosoma platyrhinos*, Girard).

In the course of a week's wanderings on the desert one will see scores of these interesting little creatures. In color and design they are often markedly different. Whether this is the result of age, of variety in food, or of different environment I cannot say, though differently marked toads will be seen within a mile or two of each other and in a very similar habitat.

One of the most beautiful is where the design is picked out in blacks, brick-reds, and creamy white. These colors are not all

absolutely of one shade. They gradate in tone and this adds a subtle charm to the general beauty.

Yet in movement the horned toad is slow and peculiar and the spines on his head and back give him a singularly grotesque appearance. These doubtless are the reasons that so many people are interested in them and make pets of them. They tame readily and will soon come and take flies and other insects from one's fingers. Van Denburgh tells of one of the most singular characteristics of the horned toad as follows. I copy the quotations from other writers just as he has them: "Individual specimens which have been recently caught often show considerable anger when handled, puffing themselves up and hissing fiercely, seizing their tormentor's fingers with their impotent jaws, or throwing at him a stream of blood from the corner of the eye. It is said that Mexicans call them sacred toads because they weep tears of blood." The best account of this most curious habit has been given us by Dr. O. P. Hay, who, writing of a specimen of *Phrynosoma frontale*, says, in part:

" About the first of August it was shedding its outer skin and the process appeared to be a difficult one, since the skin was dried and adhered closely. One day it occurred to me that it might facilitate matters if I should give the animal a wetting; so, taking it up, I carried it to a wash-basin of water near by and suddenly tossed the lizard into the water. The first surprise was probably experienced by the *Phrynosoma*, but the next surprise was my own, for on one side of the basin there suddenly appeared a number of spots of red fluid, which resembled blood. . . . A microscope was soon procured and an examination was made, which immediately showed that the matter ejected was really blood. . . . There appeared to be a considerable quantity of the blood, since on the sides of the vessel and on the wall near it I counted ninety of the little splotches. . . . The next day . . . I picked up the lizard and was holding it between my thumb and middle finger, and stroking its horns with my forefinger. All at once a quantity of blood was thrown out against my fingers, and a portion of it ran down the animal's neck; and this blood came directly out of the eye. It was shot backward and appeared to issue from the outer canthus. It

was impossible to determine just how much there was of the blood, but it seemed that there must have been a quarter of a teaspoonful. I went so far as to taste a small quantity of it, but all I could detect was a slight musky flavor.

" Mr. Denton . . . has communicated to me his experience with a horned toad at Sonora, California. . . . He was gently stroking the animal on the back, when it appeared to look at him as if taking aim, and then, all at once, a stream of blood was shot into his eye. There was so much of it that it ran down on his shirt bosom. He thought that there was between a tablespoonful and a teaspoonful. The blood was shot out with so much force that some pain was produced, and there was pain felt for some little time, though this ceased as soon as the blood was wiped out. The next morning the eye was somewhat inflamed, but this condition soon passed away. Not long afterward, perhaps the next morning, the animal squirted blood out of the other eye."

Mr. Vernon Bailey, who caught the horned toad which afterward became the subject of Dr. Hay's article, writes:

" On taking it in my hand a little jet of blood spurted from one eye a distance of fifteen inches and spattered on my shoulder. Turning it over to examine the eye, another stream spurted from the other eye. This he did four or five times from both eyes, until my hands, clothes, and gun were sprinkled over with fine drops of bright red blood. . . . About four hours later it spurted three more streams from its eyes." I myself have observed this strange performance twice, only in these instances the blood was not projected forcibly but trickled down the sides of the lizards' heads.

Upon this remarkable habit of the horned toad Professor Ditmars gives his experience as follows:

"Various disputes have arisen over the possibility of this occurrence. Over two hundred specimens, representing different species, were examined. These were teased and provoked most persistently by the writer and the keepers, but without result. Their general attitude was to feign death, with eyes closed. They seldom attempted to bite, but when placed on the ground would make off with great show of speed.

"During these investigations Mr. Otto Eggeling of this city

received a consignment of five hundred horned lizards, and with the idea that from this large number there should be some display of the habit — if it existed — he transferred them from one box to another, with vigorous handling. Mr. Eggeling states that although some struggled energetically to escape from his grasp, some feigned death, and a few made feeble efforts to bite, no jet of blood was ejected from a single individual. Subsequently Mr. Eggeling has received other shipments of horned 'toads,' aggregating a total number examined of about eight hundred, and thus far he has failed to observe a single instance of the interesting performance that has been accredited to these creatures. With eight hundred of these lizards examined by Mr. Eggeling, and over two hundred by the writer, it appears that over a thousand specimens of these lizards, representing principally the species *Phrynosoma cornutum*, *P. coronatum*, and *P. plainvellei*, have passed careful observation with no exhibition of the very eccentric habit referred to. It therefore appears that the performance described by Dr. O. P. Hay must be limited to a very small proportion of these creatures, or was accidentally elicited by some unique measure not practised during our investigations."

Desert tortoise, top view

Personally my own experience has been like that of Dr. Ditmars. I have aroused the toad so that his eyes have been suffused with blood, but I never got one angry enough to eject the blood. Yet friends, scientific and others, in whose word I have the most implicit faith, tell me that they have witnessed it so often that they gaze at me in astonishment when I tell them that I have never seen it.

Be that, however, as it may (as I fully accept the testimony above given), I can state most positively that the chuckwalla, when teased or angered, will eject water from his eyes — enough to cause surprise to the beholder — say from twenty to forty drops. I do not recall that any observer has yet noted this fact which I have witnessed again and again.

In certain localities the desert tortoise (*Gopherus agassizii*, Cooper) is quite common. I have picked up five specimens in one afternoon, and a friend of mine eight in two days. Three fine examples are walking around my feet now as I write, and one is quite companionable, for he wants to walk all over my desk when I lift him up. He has no objections to my scratching his head and gently rubbing the soft part of his flesh between his head and legs. The shell of this particular tortoise is nine inches broad and eleven and one-half inches long. With head and tail extended he would be fully three inches longer. His markings are very beautiful as will be seen from Mr. Eytel's drawing. While he draws his head in with great rapidity he shows little fear when I take him on my lap for further examination. His eyes are large, bright, and clear, and have an opaque covering which slides over them from the front backward at will. The eyelid covers from below. While the top of his head is as hard and scaly as alligator skin, the tip of his nose is soft and sensitive. In traveling he feels with his nose. It is his organ of touch. His front legs are — I scarcely know what shape to call them, but more awkward and clumsy looking contrivances could not be planned. When folded up in his shell they double up, the hand with its five horny toes (fingers or claws) shutting inside, the whole presenting a solid and armored front to the foe, for the exposed parts of the legs are covered with a scaly armor that is very tough and impenetrable. The rear legs (fitted with only four toes) are more like those of an elephant than anything else I can think of, especially when he stretches them out, and his tiny, pointed tail is capable of being folded up so that it does not appear. When molested or afraid he instantly draws in head, legs, and tail, thus completely closing up both front and rear apertures and presenting nothing but armored surfaces to his enemies.

Desert tortoise, bottom view

Yet though so clumsy looking he is a more rapid traveler than one would imagine, and his distances lead one to believe that Æsop knew what he was talking about when he made the tortoise win the race with the hare. He can walk fully a dozen miles

in a dozen hours, and when it comes to burrowing, I have seen one make a hole in the ground with — while not the rapidity of the dog — far greater sureness and persistence. They can scoop out the earth and throw it behind them with accuracy and speed.

In walking he first reaches out with the left front foot, then right rear foot, right front foot and left rear. The forefoot is lifted awkwardly, and on placing it down it rests first on the inside toe and then upon all the others in order, and, as he progresses, finally upon the ball of the foot, to be lifted again, reached forward and replaced upon the first toe, etc. As he rests his weight upon it he gives it a partial twist as the corresponding rear foot is raised for its progressive motion. The rear feet rest upon the ball of the foot and toes simultaneously, just as the elephant's does, if my memory serves me correctly.

The reach of the tortoise is very irregular, but rather remarkable. Here are the successive reaches of his left front foot, in inches: 5; $3\frac{3}{4}$; $5\frac{1}{8}$; $6\frac{1}{2}$; $4\frac{1}{2}$; $5\frac{1}{2}$; 7; $5\frac{1}{2}$; $6\frac{1}{4}$; 5; $4\frac{1}{4}$; $7\frac{1}{8}$; $6\frac{1}{2}$; 4.

When alarmed he can not only take long strides (as some of these indicate), but is able to go at considerable speed, fully two and one-half miles per hour.

In color the shell is blackish brown on top and lighter beneath, with the peculiar horn-like color showing even in his rough and unpolished condition. The under shell or plastron, as will be seen from the drawing, has a front extension upon which the head rests and slides in and out. This also serves another most valuable purpose. When traveling over rocky surfaces, the turtle must sometimes drop from one level to another. I have seen them fall fully two feet. In walking they come to the edge of such a place, calmly look over, indifferently give their shell a push as far as possible with their hind legs, and then with one or two more vigorous pushes thrust themselves over, to fall upon this plastron extension. If it were not there the head and neck would most certainly be injured. At the rear of the plastron the bone is curved in to allow room for the tail and anal vent.

For a few weeks I had four of these desert tortoises on a lawn in Pasadena, and spent many hours watching them. Occasionally I would bring the large one into my library for study,

and he would wander about, peering at everything on his level with the greatest apparent curiosity.

While walking the flies often settled on his nose and bothered him considerably. It was quite amusing to see the comical fashion in which he would stop and, twisting his nose toward his awkward elbow, give his nose a rub, straighten out and proceed. He evidently does not approve of the flies of civilization, for, while it cannot be denied that there are flies on the deserts away from the haunts of men, it can safely be asserted that the proportion is as one to a million in favor of the wild places.

Scorpion

When I tickle him between his neck and legs he exhales with a kind of half-grunt, and I can compare the noises he makes at such exhalations to nothing more exact than the inarticulate "guggling" of a young baby when content with full feeding.

The desert tortoise is peculiar in that he has no teeth. The lower jaw is most peculiarly constructed. The whole front of the jaw is of bone, with a slight suggestion of notching. At the rear of this exposed part inside the mouth is a parallel sharp ridge of bone or horn, thus forming a kind of groove with the outer jaw and where the teeth would ordinarily be placed.

As far as I have seen and can learn he is a pure vegetarian. He is very fond of the leaves and young shoots of many of the desert plants that are thriving at this time,— after the spring rains. All those I have caught have their jaws stained green with their recent feeding.

Scorpion

Mr. E. T. Cox, writing about the desert tortoise in the *American Naturalist*, says: "In preparing this specimen, I found on each side, between the flesh and carapax (the upper shell), a large membranous sack filled with clear water; I judged that about a pint ran out, though the animal had been some days in captivity and without water before coming into my possession. Here then is the secret of his living in such a dry region; he carries his supply of water in two tanks. The thirsty traveler, falling

in with one of these tortoises and aware of this fact, need have no fear of dying for immediate want of water."

As yet I have not brought myself to the slaughter of one of these creatures, and the men of the desert who say they eat tortoises have been able to give me no information as to the facts stated by Mr. Cox.

I have spoken to teamsters and miners who have often caught the desert tortoise, and they agree that they must have an extra water supply. But their observations necessarily were cursorily made, and I have not met with one who has dissected the tortoise. They invariably speak of the fact that when first picked up they evacuate to the amount of two or three large tablespoonfuls of clear liquid, which, however, they regard as an incontinence of urine caused either through anger or fear.

The desert tortoise is good for food, especially the flesh of his four legs. When put in hot water the scales peel completely off, and a rich, delicate flavored meat is left which epicures claim is most delicious.

Centipede

At one camp we stopped at, on one of our trips, the owner told us of his first experience in eating the desert tortoise. Said he: "I had a Mexican, Carlos Diablo, working for me. Once he spoke enthusiastically of the wonderful feasts he used to have on 'tortugas.' I paid little or no attention to him as I thought he referred to the tortugas — turtles or tortoises — of Florida or Mexico, in both of which countries he had been. It turned out later that he meant our desert turtle, and my curiosity being aroused, I told him I should like to see how it tasted. Not long after he caught a fine large turtle, and after he had killed it and completed the hard task of removing the shell and skin, he boiled the flesh during a whole night, seasoning it with salt, red pepper, and garlic. It was delicious, and I only wish I could serve you some now that you might see what fine food the desert provides."

My four specimens are now in the Bronx Zoölogical Park, New York, where I was compelled to send them, as my many absences from home render it impossible for me to keep them.

There are scores of red ant-hills on the desert, appearing like

small craters rising from the sand or gravel. Many of them are perfectly formed as to shape, and a few have the peculiar color and granulated appearance as if made of grape nuts. The material of which the "crater" is made is slowly and laboriously brought up from under ground by the ants. They are indefatigable miners and this is their waste pile. But they are not mining for the discovery or exploitation of minerals or any substance they find beneath the ground. They are merely excavating for a home and storehouses. This work is generally done in the early morning. Foraging on the outside comes later in the day. They come through the vent with a piece of stone in their antennæ with which they slowly climb up the side of the crater. A few conscientious workers carry their pieces to the top where they "dump" them to roll down on the outside. Others just find the nearest and most convenient spot, drop their burden and return for more.

Tarantula

The largest caterpillar I ever found on the desert was in April, 1906. He was on the stem of a plant which I failed to note and was fully two inches long. He had three pairs of legs very close together at his head, four pairs at regular intervals on his body, and one at his tail end, above which a brownish speckled horn, nearly half an inch long, was exalted. His body was striped green down the center, with a black stripe on each side of this, followed by a narrow green strip and a narrow black strip. Then there came a broad strip of green, and at the junction of sides and belly a slight strip of spotted red and black. There were touches of red at regular intervals on the upper black stripes.

Tarantula

Though as a rule there are few mosquitoes on the desert there are times when they come in swarms. In the year 1900, in June, not far from Imperial Junction there seemed to be a breeding place for them. Their numbers were countless and they made sleep at night impossible. The same year and at the same time, or a few days later, a few miles from Yuma, near the Colorado River, they made life a burden. Constant smudging, day and

night, was necessary. A work train was sent to do some special work on the railway, and at times the workmen were so distressed that they grew frantic and threatened to quit work to a man unless they were given a few hours' release. To accord them a little rest the train was brought up to Ogilby and then provision made for keeping smudges going during the rest of the time the work was progressing.

The tarantula (*Mygale avicularia*) is occasionally seen on the desert. It is nothing but a large, hairy, overgrown spider. There are two or three different species, but except to the entomologist the differences seem slight. They belong to the trap-door spider family.

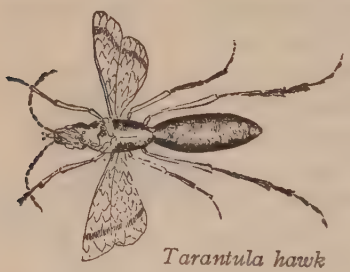
The great foe to the tarantula is a hornet or wasp-like insect called the tarantula hawk (*Pompilius formosus*). The female, when ready to lay her eggs, flies eagerly about looking for a tarantula. As soon as she sees the great, hairy-bodied spider, she alights upon it and with the speed of a flash of lightning darts her sting into it. There must be some preservative quality in the poison she injects, for, while the insect dies, its body does not decompose nor dry out. It has not yet served its purpose. Digging a hole some five inches deep the hawk now rolls the body of the tarantula into it, and deposits her eggs either in or on the body. She now closes up the nest. When the larvæ leave the egg they find themselves supplied with food enough to last until they are fully grown. All the transformations occur in the underground nest, and finally the adult insect emerges after reaching its perfect stage.

Tarantula

The dinapate is one of the largest beetles of its family and is also one of the rarest in the world. It was originally found by an entomologist named W. G. Wright in the wild palms of the Colorado Desert. Year after year he visited these palms and secured as many beetles as he could, collectors being anxious to obtain them.

In January, 1886, a description was published in the "Transactions of the American Entomological Society," by Dr. G. H.

Horn, of a large beetle, larger than any *Bostrichide* known, which was said to have been found on the Mohave Desert. It was named *Dinapate wrightii* after its finder. Little was known of its habits or that of its larvæ, as no one but Mr. Wright knew of its existence. But in 1897, H. G. Hubbard, one of the most enthusiastic entomologists of the United States, started out on a still hunt for the beetle and its life habits. He found that it was not an inmate of the Mohave Desert, but of the Colorado, and that it made its home in the giant fan-palms indigenous there (*Neo washingtonia filifera*). For over a month Mr. Hubbard climbed up and down the steep canyons trying to find what he was so desirous of finding, a colony of the larvæ of this wonderful beetle in one of the palms. His searches were ultimately rewarded. He first found a dead and disintegrated specimen of this gigantic Bostrychid beetle lying between dead fans at the foot of a young palm. Says he: "Many of the old palms are uprooted by the flood waters, and I saw probably fifty of these prostrate trunks upon the ground. Almost all of them are perforated all over with round open holes, into most of which I can insert the end of my thumb. Some of the holes will, however, only admit the little finger. These holes, evidently made by dinapate larvæ, open directly into a huge pupa chamber which is two inches long and lies vertically with the grain not more than one or two inches from the surface."



Tarantula hawk

He found the logs showing from one hundred to two hundred and fifty holes of exit of the larvæ, and concluded that once a log is vacated by a colony of them it is never again attacked, for the reason that all its nourishment is completely eaten out.

The female cuts into the trunk of these giant palms and there deposits her eggs. When it is remembered that the fan leaves falling around the trunk make a covering from *eight to ten feet thick*, it can be seen what a great borer the beetle must be to cut its way through into the trunk. No living tree is ever sup-

posed to be attacked by them, though it has been suspected that the dinapate herself kills the tree in order to make a home for her eggs. On this matter Mr. Hubbard writes: "When I consider the limited number of these trees (palms) in existence in a wild state, and the slender chance the female beetle must have of finding a dying tree in the right condition and at the right time, I am more than ever inclined to suspect that the beetles deliberately kill the tree in which they oviposit. If they killed the tree merely by feeding as adults upon the buds there would be many trees killed, for often more than two hundred adults issue from a single infested trunk."

The larvæ remain in the trunk one, two, or possibly three years ere they emerge as full-grown beetles, and during this time they tunnel the palm into a series of galleries in a truly marvelous fashion. "It is hard to realize the enormous extent and dimensions of the dinapate galleries," says Hubbard. "Not the largest of our Florida palmettos could support more than three or four of these larvæ; they would eat it all up and then die of starvation. If there are twenty or thirty holes in one of the Washingtonia palms, one finds the interior entirely eaten out from end to end, and one can follow the galleries, over one inch in diameter, for twenty feet up and down the trunk following the grain and without diminishing sensibly in diameter. Then think of the yards and yards of smaller galleries made by the larvæ while still young. Such extensive and prodigious borings cannot be made in one or two years, and certainly not in any tree trunk of moderate size. There is certainly no other plant here than this Washingtonia palm that is capable of supporting a brood of these huge and voracious grubs. Therefore I do not hesitate to assert that they exist only in the Washingtonia, and that they are very certain soon to become extinct. I regard the discovery of a colony as one of the most interesting entomological events of my life."

The Dinapate wrightii, the large beetle found in the desert palms

He took four pieces of the trunk, containing the larvæ, into his bedroom and during the night enjoyed hearing them cut the

fiber with a snap like a pair of scissors. In June these pieces were sent to Washington and in August a small number of the beetles were bred from the wood. This was a matter for great rejoicing. Mr. Eytel's drawing is from a photograph of one of these bred specimens.

Mr. Wright's operations in the first instance were carried on with great stealth. He did not want others to know of his find. In his eagerness to get the rare beetles he cut down a number of the palms, but as they were already dead this was not a serious injury. When the holes were seen by the people at Palm Springs they deemed them made by carpenter-bees.

The dinapate has been called the dodo of beetles, both on account of its size and also that it is supposed to be almost extinct. It is a large black beetle, fully an inch in length, the female being larger than the male. It has a strong frontal plate and the great jaws of the pupæ are wonderfully adapted for the work of cutting their way through the fibrous part of the palm in their search for food.

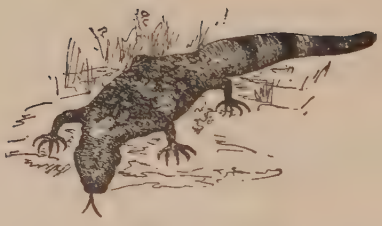
The entomologist will find the Colorado Desert a rich field. It has never yet been fully explored, and new species are pretty sure to reward the man who is willing to make the desert his abiding place for a while and penetrate, as does the prospector, into its secret recesses. Near the river there are numbers of a fine green Buprestid (*Gyascutus planicosta*), easily caught in the early morning hours. The click-beetle (*Chalcolepidius webbii*) is abundant on the willows. It reaches a length of nearly an inch and a half, and is bluish in color with a broad cream-colored border. To merely mention the desert species would fill several pages, and while, of course, many of them are to be found elsewhere, those that appear on the desert are often modified by the peculiar conditions that exist there.

One interesting feature of the desert insects is that during a dry year the eggs and pupæ will be in a dormant state. Or, at least, this is the supposition of entomologists most familiar with desert conditions. Either this is the case or the beetles that reach a mature condition are so few as not to be seen. Experiments have confirmed the former view, for eggs and pupæ have been submitted to adverse conditions and it was found that this arrested

their development. The fertility of the eggs was not impaired, and the following season, when favorable conditions existed, full development followed.

The best time by far for the entomologist on the desert is during or immediately after a long wet season. These seasons rarely occur, but when they do an abundance of rare objects is sure to appear. Not only an abundance in the variety, but also, as in the case of the dinapate, an abundance of one particularly rare species.

Dinapate



Gila monster

CHAPTER XIV

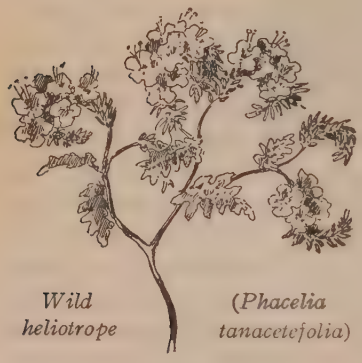
Plant Life on the Desert

CLASS unto themselves, the plants of the desert are set apart. Or at least that is what they seem when you make your first cursory survey. Extended observation, however, demonstrates that, while there are marked desert features in many plants known elsewhere, and quite a number that are confined to the desert, there is not as much difference, after all, between the flora of the desert and that of the more fertile areas. It is the conditions that make the differences. Plants, even as animals and man, find life a hard struggle upon the desert, and yet, with a picture in my mind's eye of the rich and glorious beauty of the flowers as we found them in various almost unknown desert valleys in March (1906), where they flourished in luxurious abundance and marvelous variety, such words seem utter nonsense. But one might travel on the desert for years and not see such a display. In twenty-five years of winter and summer experiences, this was the first time I had been so privileged. The facts are, that to most plants the fierce heat and the lack of moisture render growth most difficult, and that,

except when freshened up and brightened by the rains, most of the trees and bushes have a bleached, blonde, bloodless appearance that adds to the neutral, colorless effects of the floor of the desert.

Seen when rain has been scarce even scientific observers come away railing at the scarcity of plant life, and the almost waste of time their search has proved to be.

Dr. John L. Le Conte, of the California State University, who visited the desert in 1850, was not impressed by what he saw. He says the only resources to shorten the way were very limited geology, and, as may be inferred from the nature of the country, "equally poor botany. It is no wonder that government reports abound with names of plants which suggest nothing but linguistic difficulties, for there is little else in the vast deserts to occupy the attention of the intelligent traveler; and with the determination of one resolved to struggle with the dull sublimity of inorganic matter, he frequently breaks off and preserves a piece of some hideous vegetable, whose only charms are the ugliness of its form, the lifelessness of its color, and the apparent absence of flower and foliage and everything else that renders a plant attractive."



Wild heliotrope (*Phacelia tanacetefolia*)

There are times when these severe strictures upon the floral presentations of the desert seem to be deserved. At others they would appear to the most casual observer to be unmitigated untruths and impossible slanders.

This fact cannot be too strongly impressed both upon my readers and desert visitants. It is a place of contrasts, marked and vivid. Plant life is no exception to the general rule. One year, one month in the year it dazzles, startles, delights, enchants with the reckless variety and profuse gorgeousness of its floral display, and then eleven years, or eleven months (speaking figuratively), it would nearer fit Dr. Le Conte's depreciative view.

Photo. by H. C. Tibbitts, San Francisco, Cal.

MESQUITE TREES ON THE COLORADO DESERT

These very facts are one of the desert's allurements. If in your association with some person you know there is a possibility that you will strike him at a time when he will far transcend ordinary mankind in the brilliancy and charm of his conversation, you will be willing to undergo considerable boredom to catch those rare flashes of genius and mental glory. So with the desert. And yet I wish also to assert in the most forceful manner, that if one can go to the desert in the receptive spirit at any time, he will find the plant life of the most restrained period of growth more than interesting. It is fascinating. The cactuses alone are a most fascinating study, and when to these are added the peculiar desert trees and plants, the botanist has a field rich, rare, and delightful.

"Hen and chickens" (Cotyledon pulverulenta)

Plant life on the desert has a wonderful vitality, or Nature has a marvelous way of caring for it, for after a rain the flowers spring up in a profusion and variety that are as bewildering as they are delightful. Here are flowers that one seldom sees; not a few; nor are they poor specimens, but in great quantities, and full grown. One drives over mile after mile of them, fascinated and entranced. They are worthy children of noble sires. Whence came they? Are they natural products of the desert? I scarcely think so! It seems to me it is far more likely that they have been preserved from some far-away, long-passed epoch of Time, when the desert was more hospitable and kind to flower and animal. As the climatic and other changes have come the seeds have been preserved in the earth, lying dormant perhaps for long decades, or even centuries, deep below the surface. Then fierce rains, cloudbursts, floods came and almost uncovered them, leaving them with just enough of protection to give shelter and moisture, which, in the heat of the sun, caused germination. Then the eye

of the solitary desert traveler was charmed and delighted by the new floral treasures suddenly called forth in such wealth and profusion. For a few short days he enjoys them to the full, then they die down and are not seen again, perhaps, for several years.

It is wonderful how desert plants and trees reach out for water. One day I saw exposed what appeared to be an insulated telephone wire of a deep reddish brown color. It was the root of a bush that seemed quite dead until I carefully examined it, and then you saw that it was very much alive. The root was exposed by a winter freshet, and as I pulled it I dragged out more until there was over twenty feet of it. It is this power of reaching out for water, this persistence in clinging to a life that seems almost hopeless, that give one such an admiration for the brave struggles of these desert plants. They persist in living. They are unconscious examples of the strenuous life. They know, or at least seem to live as if they knew, that there is no attainment without constant and strong endeavor.

Then, too, what a difference there is between the cultivated garden and the natural growth of flowers in the desert! In the garden everything is forced, artificial, conventional, in bonds. Every flower must grow where it is set, and it is trained and trimmed and tied and directed into a stiff primness that some people regard as beauty, but that a large-minded soul cannot help but feel is a torture and a spoliation of the real life of the flower. But in the desert all is free. Liberty is supreme. Every flower grows when, where, and as it will; and there is a spontaneity, a wild, glad, joyous giving apparent in every flower that grows, as if it were conscious of the fact that it gives of its sweetness and beauty, not at the behest of a gardener, but of its own gracious will. This is the charm of the flowers we see and enjoy in the desert valleys.

In his incomparable prose-poem "The Desert," Dr. John C. Van Dyke says: "Many tales are told of the flowers that grow on the waste after the rains, but I have not seen them though I have seen the rains." How I wish the distinguished writer could have been with me on the trip to the Brooklyn mine in April, 1906. In the Crawford Valley (as well as others) the desert set forth a display of flowers that I have never before seen equaled.

I have been at flower shows, have reveled in the floral treasures of emperors, kings, queens, and nations, have been entranced by the horticultural glories of Kew Gardens, Kensington Gardens, *les Jardins des Plantes*, and the great displays at numbers of World's Fairs, yet I speak the truth with calm sobriety when I say that for splendor and immensity of display, everything else seen in the whole of my life put together was not to be compared with this. Possibly the San Joaquin plains, as described by John Muir and Madge Morris, in the early days before many white feet with their "civilizing" destruction of nature's glories had trodden upon them, may have been equal to that which we saw. Mile after mile, straight ahead, behind us, and on each side, were carpeted with flowers. To merely name them would take several pages of this book, and to give adequate descriptions would need a volume. Here were phacelias, rare and beautiful asters, and gilias that excited the cupidity of expert botanists when their eyes fell on them; thousands of specimens of *Mohavea viscida*, their primrose leaves dotted with reddish spots, and many varieties of erigeron. The enotheras were marvelously represented, and, as in the flowers of the cactus, these desert specimens were unusually delicate and beautiful in coloring. Lupines, borages, kramerias, mentzelias — but why merely name them? Suffice it to say that hours were required to merely go over the specimens we brought home.

Gum plant (*Grindelia cuneifolia*)

In their growth and native arrangement they often delighted beyond measure. A richly green creosote bush would be surrounded by the flowers in circular beds, but devoid of the rigidity of division that ordinary gardeners seem to prize, and that Nature ever abhors. First there would be a circle of blue, then white, yellow, pink, white and yellow, terminating at last in a long approach of a rare and beautiful gilia. Sometimes these gilias were white, but there were equal numbers of pink, and yellow.

Altogether the picture of the flowers of Pinto Valley has made an epoch in my memory. *That* is one of the things I can never forget.

There is no doubt that to the plant life some of the healing virtues of the desert are attributable. The air is often redolent with the pungent odors extracted by the fierce sun from the plants, which, full of resinous and other oily substances, render them forth only on such strong persuasion. Being thus held in suspension in the atmosphere that closely hugs the earth, they constitute of it a specially medicated area in which every breath taken, whether through mouth or nostrils, penetrates to the bronchial tubes and lungs and deposits there the tiny particles of healing virtue. Here is the *vis medicatrix naturæ* at its best.

Desert thistle poppy
(*Argemone platyceras*)

Among other plants one here finds the wild tobacco, which with its large long leaves and rich yellow blossoms grows profusely. It is common to find it six feet high, and now and again one will see a clump of it with stalks fifteen and even twenty feet high. The Mexicans claim that it is not indigenous to this part of California but that it was brought here from Mexico.

The quelite is a large species of chenopodium, the seeds of which the Indians have long used in making a rude bread which is by no means unpalatable. In the days of early emigration to the gold country this plant formed the chief feed of the horses and cattle. The emigrants called it "careless weed" from an imperfect hearing or rendition of the Indian name. It would better be spelled kel-é-tey.

Of lichens alone the desert has a wonderful assortment, not, of course, in the actual sandy barren areas, but in the oases and on the mountain slopes. On the granite and other rocks, on the earth, among the mosses, on living pines and oaks, on dead

pine wood logs and branches, fertile in some places, barren in others close by, these modest and unobtrusive members of the plant family grow.

The trees of the desert are equally as interesting as the flowers. There is not a large variety, but each one has its own peculiar attractiveness. There are several trees that immediately attract the attention of newcomers to the desert, and that grow upon acquaintance. These are the honey-pod mesquite (the *Algarobia glandulosa* of Torrey, and the *Prosopis velutina* of later botanists); the screw-bean mesquite (*Prosopis pubescens*), the smoke tree (*Dalea spinosa*), the desert willow (*Chilopsis saligna*), the small-leaved palo verde (*Parkinsonia microphylla*),

A group of old mesquites

and the creosote bush (*Larrea mexicana*). In various canyons as well as on the plain near Indio the fan-palm (*Washingtonia filifera*) has its native and only habitat, this palm being now determined as a distinctively Colorado Desert species.

On the mountains are the nut-pines, *Pinus coulteri*, which produce the largest cone known. It abounds on Mount San Jacinto. Though the Saboba and Santa Rosa Indians do not eat the nuts it is said that other Indians do, but of this I am not sure. The pinion pine (*Pinus monophylla*), commonly known as the *Pinus edulis*, is found on many of the mountain slopes and is justly esteemed for the rich flavor of its nuts. The Mexican locust tree (*Robinia neo-mexicana*) is also found on the desert.

In several of the dry washes near the Chuckwalla range I

found specimens of the cat's claw (*Acacia greggii*, Gray) and it is seen occasionally as far west as Banning.

In some of the valleys the principal feature of vegetable growth is the ocotillo (*Fouquiera splendens*). This peculiar tree is a bunch of thorny sticks shooting up from a common center, each stick evidently trying to grow up straight but, being compelled to yield room to its fellows, finally compromising on a slight angle. Each stalk grows independently of all others and attains its own individual height. Some are very straight, others fall over almost like the graceful palm, and still others have sudden angles and strange twists. Sometimes the very tips, after the stem has grown up straight to a height of twelve, fifteen, and even eighteen feet, droop over with an air of dejection which seems to say the battle to keep straight is too hard. Occasionally they attain a height of twenty feet. I have counted one hundred and twenty stems on one ocotillo, though few have so many. The general appearance of the tree is as if a handful of straight-stemmed plants had been put into a vase, so that, while at the base the stems were kept all together, they had spread out, up above, in every direction. I found them in full flower at the end of March. The flower is a flaunting panicle of a brilliant scarlet, composed of beautiful bell-like blossoms. Sometimes, when looking toward the sun, the flower appears like a flaming plumaged paroquet or other brilliantly feathered bird resting on the end of the limb.

The mesquite

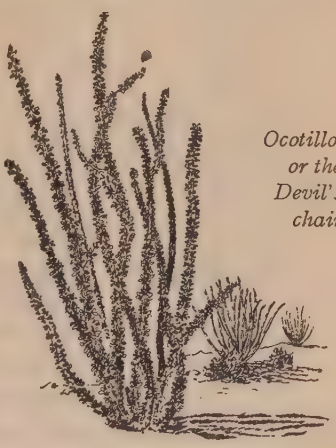
The ocotillo has the remarkable habit of leafing out after a rain. The leaves are a tender green and spring out along the

Photo. by George Wharton James

THE OCOTILLO IN LEAF

stems, side by side with the thorns. Even though it be but a slight rain and only the stems (not the root) get wet, the leaves appear. Padre Junipero Serra, the founder of the California missions, had a very poor idea of this "candle cactus," as he called it. He said it was useless, even for fire-wood. Between Yuma and Pilot Knob there are quantities of them, as also at the upper end of Crawford Valley.

A noticeable peculiarity of such desert trees as the mesquite, palo verde, and desert willow is that they are seldom so tall as the same species elsewhere. This is owing to the intense heat, causing atrophy of the growing bud of the upright stem of the tree. This bud, being above the rest of the tree, necessarily receives the direct, full rays of the sun. Unless it is specially protected — as some of the desert plants are — it becomes scorched and either grows very slowly or dies and falls off. This compels the outforcing of lateral buds, an instinct of nature to protect the tree from destruction. These lateral buds grow with comparative profusion, consequently the tree gains in density and breadth what it loses in height. The result is that many desert trees have the appearance of being stunted or dwarfed in height, but are "stocky" and bulky below.



Ocotillo, or the Devil's chair

The mesquite is a fine illustration of this, for it is no uncommon thing in the Coachella Valley to find this tree with branches outspreading far and wide from the ground up. They appear as if some great weight had pressed them down, and like truth they had risen again, yet bearing in their aspect the proof of their having been forced down to the earth.

The desert palm, however, is not a "croucher" like the mesquite. It shoots bravely up into the fiercely heated atmosphere, for it loves its head in the fire. The young palms always have a

mantle of drooping dead leaves which clothes them to the ground. Thus the tender young stem is protected from the too fierce heat of the sun, and "the mold within the curtained area is kept cool and moist while all around is hard-baked soil. When the tap-root is deep down to water level, the sheath of thatch may be burned away as is done by the Indians" to render the fruit more easily gathered. The palm is an endogen, its core of life in the heart of the thick, dense mossy bole. So even after these fires the trees survive, the perfect harmony of their natural growth unaltered, their glorious crowns of vivid green still trustfully reaching up toward the sun that has destroyed every other sprout of tender verdure.

The screw mesquite is a more beautiful tree than the bean mesquite, its narrow outline and ascendant branches giving it a strikingly different appearance and much more graceful figure.

The screw-bean mesquite

Almost all old prospectors and desert dwellers contend that the coolest and most comfortable shade of the desert is that of the mesquite, though their explanations for that fact often vary greatly. Probably the reason is that the delicately divided leaves allow a perfect circulation of air which is cooled by passing over the countless cool surfaces of the leaves, at the same time keeping off the direct rays of the sun.

The mesquite leaves out after the rains, if there are any, or generally about the end of March. Its tender leaves are a sweet soft green that is peculiarly restful to the eye awearied with the long stretches of gray sand, alkali-crusted clays, and effloresced salt. In the summer the darker green is crowned and variegated here and there with patches of the parasitic mistletoe, which, however pernicious in its influence upon the tree, certainly has a picturesque effect upon its color, for its rich Vandyke brown with a tinge of reddish gray is most effective and agreeable.

The mistletoe (*Phoradendron*) is a common feature of desert trees, the parasite growing so abundantly as to almost hide the

leafage and growth of its host. Several varieties are found on the desert.

The bean mesquite and screw mesquite both flower from April to July, while the cat's claw or desert acacia (*Acacia greggii*) is a month later. The palo verde (*Parkinsonia torreyana*) generally blossoms in May, but I have seen it in full bloom as early as March.

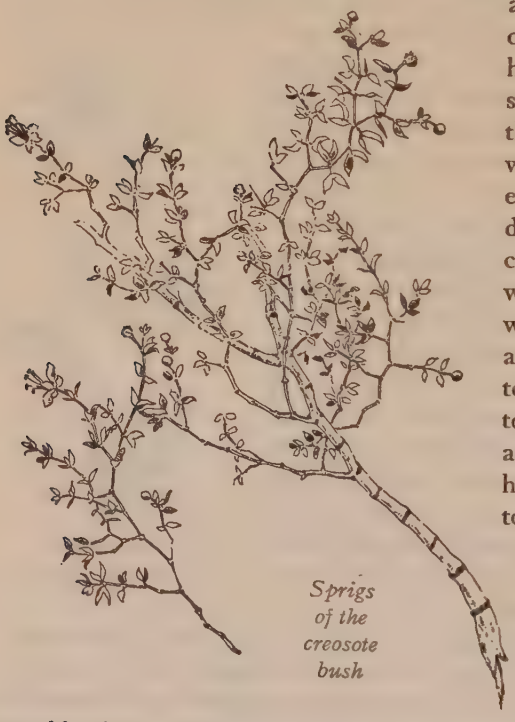
The mesquite, palo verde, ironwood and cottonwood do well under cultivation, the two former being especially desirable in this desert region. As a decorative and landscape tree there is nothing superior to the mesquite for desert regions. They are hardy in the most adverse conditions, and yet can stand a much larger supply of water than they ever receive in their natural condition. For wood they are both useful and necessary. During the past years the mesquite regions have been almost denuded of this valuable tree, and as far as I know not one single effort has been made to preserve it. If this course is long continued people on the desert will suffer as those elsewhere have done who have neglected proper and natural precautions to provide for a continuance of supply. The mesquite grows well from seed, needs little care, and in eight to ten years attains full size.

False tidytips
(*Leptosyne douglasii*)

Bee-keeping can profitably be carried on in the regions where mesquites abound. It is found that an ordinary sized tree, one, say, fifteen feet high and thirty feet in diameter, will contain as many as fifty thousand blossoms, which will give at least two and one-third pounds of honey. Mesquite honey is one of the best that finds its way into the market, being of pure white color, rich in sweetness, and of delicious flavor. In the excessive heat and dryness of the desert the honey products would speedily evaporate the surplus moisture and ripen, a natural process which enhances its keeping quality. It also increases the weight some two to four pounds per five-gallon can.

The arrow-weed, which is very common on the desert, is also found to be a good honey plant, making a rich amber-colored honey, which, while not equal to mesquite honey, is still most palatable and finds a ready market.

The flower of the palo verde is a soft, beautiful, alluring yellow. Every point becomes a flower, and each seems more charming than the other. Riding along in a deep-walled canyon, the mind as well as the body oppressed by the heat of the desert sun and the height of the enclosing walls, which are devoid of every vestige of verdure, you suddenly come upon a side wash or canyon where there is soil and moisture enough to give nourishment to this interesting and singular tree. It has blossomed from top to bottom and all around. It is a vision of loveliness all the more startling that it is so unexpected. Green and yellow, blended and blending in such soft, sweet shades, you cannot keep from the reflection that God must love beauty for its own and His own sake, for here is this desert glory wasting the sweetness of its beauty on the desert.



Sprigs of the creosote bush

The dalea spinosa is often called by the prospectors the smoke tree. It is seen nowhere else than on the desert. There are several varieties of dalea, but they are all desert habitants. Its leaves are a kind of spine, which, however, look like foliage at a

distance. With its gray limbs and delicate sage-green spiculæ it appears, when seen at a short distance, not unlike a filmy, wind-blown, smoke cloud, ascending from some strange and deserted camp-fire, with white streaks of sunlight darting through it. But beware how you allow its peculiar beauty to allure you to approach it too nearly and too carelessly. For if you do you will soon discover why it is also called by the miners and teamsters "the porcupine tree."

When flowering the dalea spinosa is a most gorgeous and glowing spectacle. Every point blossoms into flower, and every flower is a treasure of deep purple. Imagine a tree covered with fifty to a hundred thousand of these blossoms, bathed in the pure, luminous desert atmosphere, and made glowing and resplendent in the desert sun. It is a spectacle of royal purple that the eyes of man, unfamiliar with the desert, have never gazed upon, — a spectacle of color that would have dazzled the eyes of those used to the royal purple of the great Solomon when he and his spouse ascended the throne, aye, even had he and his whole court been robed in the transcendent richness of the Tyrian purple.

Sunshine
(*Baeria gracilis*)

Greasewood of many kinds (*Atriplex*) is found on the desert. Like the creosote bush it is ubiquitous. Though at first it looks "bloodless" and uninteresting, it becomes vested with its own charm when one understands its difficulties, its habits of growth, and its desert triumphs.

It is one of the atriplexes — the black salt-bush — that the Indians of Martinez use for coloring the splints of their basketry black. Their name for it is *gnah-yil*. They boil the plant and squeeze out the juice, and in the liquor, in which they allow the stalks to remain mixed with ashes, they soak their splints for about a week. The black is not as deep and perfect as the natural black of the martynia, but it is effective and permanent.

The white salt-bush is very common in various parts of the desert, and in Mesquite Land grows to a great height. I have seen in-

dividual bushes fully twenty feet high. In Santa Barbara this beautiful plant is cultivated for hedges. Trimmed and pruned, it looks far better than most hedge growths, and it adds quite a novel factor of beauty to that always beautiful town of the Virgin Saint. This is not exactly the same species as that found on the desert, but it appears very similar, and is a "beach" sister of its desert brother.

Some kinds of greasewood and palo verde are used by animals as "browse" when other forage is short. Looking at them, the uninformed observer would declare that there can be no nutrition in them, yet analysis shows that they are rich in protein, fats, and carbohydrates. Indeed, some greasewoods are said to contain more protein than alfalfa.

Queen of the night cactus

The creosote bush (*Larrea tridenta*) is one of the commonest of the desert plants. It is singular how different people regard it. By some it is liked both in appearance and odor, and others disparage it in every way. Dr. Asa Gray says it is "so vile in odor that even mules will not eat it," and I think to most people it is objectionable. But Fremont says: "Its leaves are small, covered with a resinous substance; and, particularly when bruised and crushed, exhale a singular but very agreeable and refreshing odor." Mr. Eytel agrees with Dr. Gray, while I find the odor affects me as it did Fremont. Its leaves are of rich olive-green, and its flowers are a delicate yellow, coming out of a green calyx, and with separate seed-pods tufted like a tiny bunch of cotton. It grows as high as ten and fifteen feet, though its average is perhaps not more than eight or nine feet, and in form, in pliancy of its branches, in the richness of its color, in the shape of its leaves, as well as in its yellow flowers and white cottony tufts, it constitutes a singularly graceful bush. Indeed, to me, there are few of our garden shrubs that surpass it in general effect.

The desert willow (*Chilopsis saligna*) has somewhat the appearance of the catalpa. It flowers beautifully after the winter rains, a delicate white, with purple and pink tintings of color in a bell-like blossom. It is fairly abundant in the canyons on the northeast of the Salton Basin.

While to the ordinary eye there are not many varieties of cactus, it is possible that the scientists have discovered in the American Southwest pretty well on to a thousand different species.

I once asked an old Colorado Desert prospector how many varieties of cactus he was familiar with. "By gosh," said he, "you city fellers have no idea how many kinds we got. I know every one of 'em. There's the 'full of stickers,' 'all stickers,' 'never-fail stickers,' 'stick everybody,' 'the stick and stay in,' 'the sharp stickers,' 'the extra sharp stickers,' 'big stickers,' 'little stickers,' 'big and little stickers,' 'stick while you sleep,' 'stick while you wait,' 'stick 'em alive,' 'stick 'em dead,' 'stick unexpectedly,' 'stick anyhow,' 'stick through leather,' 'stick through anything,' 'the stick in and never come out,' 'the stick and fester cactus,' 'the cat's claws cactus,' 'the barbed fish-hook cactus,' 'the rattlesnake's fang cactus,' 'the stick seven ways at once cactus,' 'the impartial sticker,' 'the democratic sticker,' 'the deep sticker,' and a few others."

I am not scientist enough to pass judgment upon the accuracy of the old prospector's classification, but to my layman-like mind he seems to have been pretty successful in his endeavors to tabulate them all.

It is interesting to note that different species of cactus are found on both sides of the mountain ranges that separate the desert from the coast. The species are much alike, yet clearly distinct, and are not known to cross the range. This applies to the echinocactus, the opuntia, the mamillaria, and the cereus.

Dr. Veatch, who was one of the earliest of scientists to visit the mud volcanoes of the desert, had quite an experience among the cactuses, as he journeyed over the San Felipe Pass. His horse became irritated or frightened and began to plunge, so he threw himself off, and in the struggle that ensued, as the horse tried to get away, the doctor was dragged and shoved alternately amongst opuntias higher than his head, until his clothes, to use

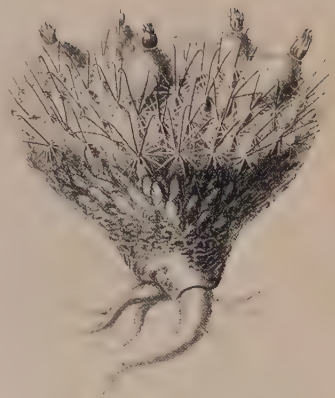
his own expression, "were literally pinned to the flesh from head to foot by the barbed needle-like prickles."

Cactuses thrive on the desert as if specially guarded. Here are the tiny mamillaria in several varieties, though one has to hunt for them. But how well such a hunt is repaid! Small, armored, armed balls, they have tufts of flowers of super-earthly beauty and of tints and colors not surpassed by any flowers of earth. I have found the *Mamillaria echinus*, with its plum-like buds out of which the dainty flowerets burst; the *M. macromeris*, with its long spines and floral crown of feather-like petals; the bunchy *M. radiosa*, with its starlike clusters of spines and its lanceolate petals; the *M. phellosperma* and *M. grahami* and several other species.

Pentachaeta aurea

The *Mamillaria grahami* is a most beautiful specimen of a desert plant. It grows not far from the Colorado River. Each bunch of spines has one, two, or three central spines, the chief one of which is generally hooked at the end. The flower is an exquisite and dainty blossom of a tender rose color. It was named for Colonel Graham of the U. S. Corps of Topographical Engineers whose unfortunate quarrel with Bartlett led to his withdrawal from the work of the Mexican Boundary Commission.

Here, too, are the opuntias, especially the *O. basilaris* with its look of velvety softness. But beware how you touch it. In a moment a million (more or less) of microscopic thorns have pierced your flesh, and sometimes they do not come out until after they have festered. One sees also with delight a number of *echinocactus*, and is charmed into excited runnings to and fro as new and more beautiful specimens in flower appear. There are scores of the most conspicuous of the species, the glorious *E. lecontei*, named after the former president of the State University of California, who discovered it. It is the well-known "barrel cactus," so useful to travelers on the Colorado Desert, and I have found it in the tributary canyons of the Grand Canyon,



From U. S.-Mexican Boundary Report

Mamillaria Grahami

Mamillaria Wrightii

Mamillaria Pusilla var. Texana

SPECIMENS OF CACTUSES

in Northern Arizona. It is also found in Lower California below the mouth of the Colorado River. The Mexicans call it "bisnagna," and they and the Indians often use its water storage when traveling across the desert. The mode of obtaining the water, which, of course, is the juicy pulp of the plant, is very simple if one has an axe, hatchet, or large hunting-knife. Cutting off the top of the barrel, the pulp inside is crushed with a stick or the axe-handle, thus releasing from the cells of the inner tissue the copious flow of juice therein stored. The tough and water-tight coating of the plant makes a perfect reservoir, and I have known one cactus yield nearly four pints of the refreshing liquid. It is slightly acid in taste, but relieves thirst admirably.

Tidy-tips (Layia platyglossa)

Some of the opuntias are beautiful in the extreme. They have a color, shading from light sage-green to ebony-yellow,—tones to make a connoisseur rave with delight. As the sun shines on this mass of ivory spines they become a halo, more exquisitely beautiful than any ever painted over sainted figure by enraptured artist. In shape their shiny limbs are almost like bunches of bananas turned upward. When the spines fall off, as they do each year, they look like small bunches of porcupine quills, long, sharp, and penetrating, and the slightest breeze blows them toward you. This has given rise to the popular superstition that they are attracted by the human presence and come to you in obedience to this weird influence.

The lizard, however, has no fear of the thorns. He runs in and out, under and over them, apparently without a thought, while to the unsuspecting human animal, let him but approach near enough, they seem to reach out and pierce him to the quick.

In Arizona some of the commoner forms of cactus have been singed and used as forage plants. The season of 1903–4 was one of great drought. Cattle suffered on the ranges for want of feed. Stockmen were at their wits' end to know what to do for

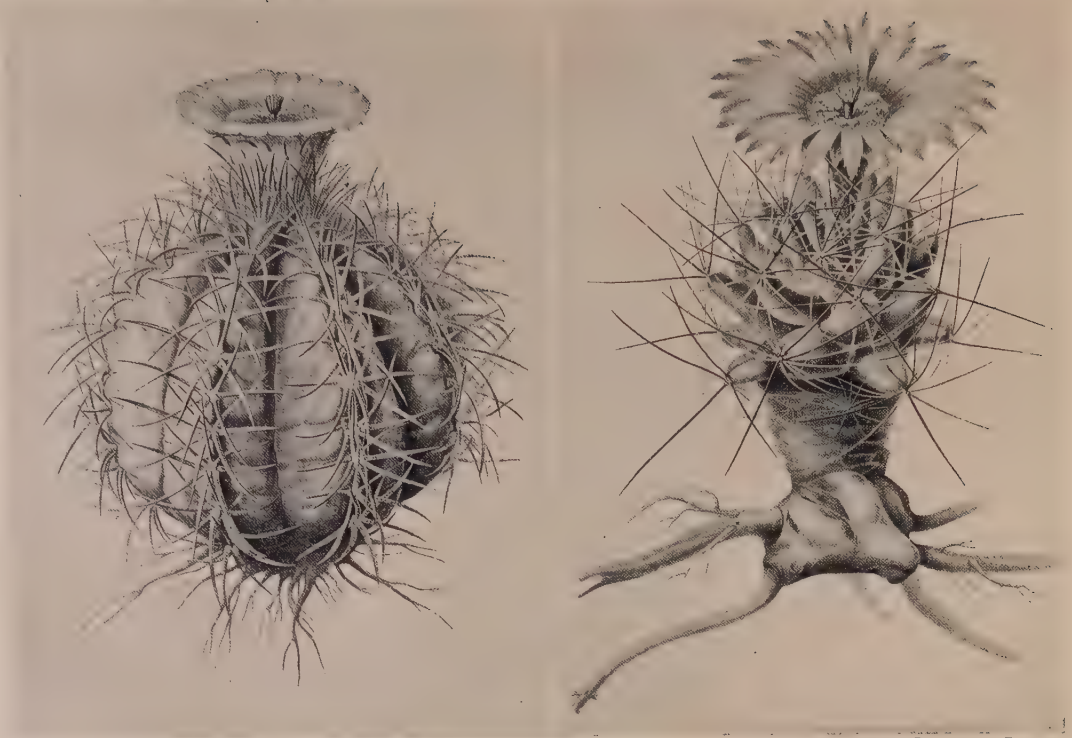
their cattle, which, half starved, were wandering away from the ranges in search of food, and wearied and unsuccessful were dying by scores. The Experimental Farm tested the matter, and analyzed the nutriment values of certain cactuses. A gasoline burner was designed, on the principle of the familiar plumber's gasoline torch, and it was found that on the desert from seven thousand to eleven thousand pounds of cactus forage could be singed each day. Hungry cattle ate it with avidity, literally devouring every particle of the prickly pears and leaving only the trunks and woody branches of the chollas. The cactus is valuable to cattle not only because of its nutritive qualities, but even more so because it contains so much water, fully seventy-five to eighty per cent being moisture.

But Luther Burbank, the wizard of plant life, has solved the spine problem without singeing. He has developed a species of spineless cactus which has high nutritive and water value. This cactus will undoubtedly, in time, be planted in large areas of the Colorado and other deserts and thus aid cattle, if not man, in solving that most difficult of desert problems, — the permanent and well-distributed supply of water in the dryest areas.[1]

The many contrivances of nature in the desert to aid tree and plant life in the struggle for existence against the great heat and the scarcity of water make a most fascinating branch of study. How comes it that delicate plants and flowers are able to bear the heat? What are the special adaptations of plant life in the desert? This subject has been most carefully studied and thoroughly presented by Frederick Vernon Coville in his "Botany of Death Valley," and what follows is based upon his remarks.

On the desert as elsewhere the customary methods of pollination appear to be sufficient. Insects in their hunts for food carry the pollen and distribute it where needed. The wind also does its share.

[1] Since the above was written I have seen the spineless cactus of Mr. Burbank, have rubbed my hands and cheeks all over it. It is a marvel. But the suggestion that this cactus will soon be planted on the desert needs qualification. If planted in the open it is so attractive as an article of food to all animals, wild and tame, that it would soon disappear. It will need to be planted in a protected area, and then fed to stock, as are corn, beets, etc.

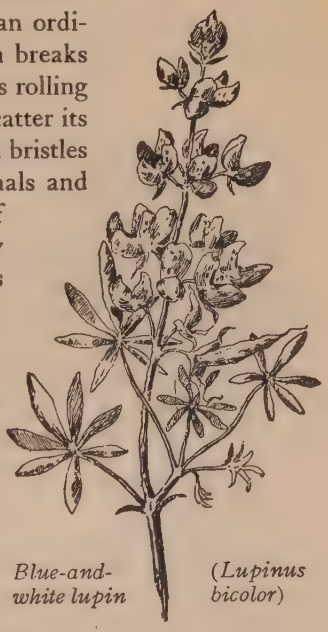


From U. S.-Mexican Boundary Report

Echinocactus Horizonthalonius *Mamillaria Macromeris*

SPECIMENS OF CACTUSES

There is wide adaptation and variety of methods in disseminating the seeds. The "downy" seeds of many compositæ, such as *Aster mohavensis*, *Tetradymia spinosa*, etc., are easily windborne; the fruits of the *Larrea* and *Eurotia* by the long divergent hairs on their surfaces; those of the *Atriplex*, *Grayia*, and *Sarcobatus* by the plate-like enlargement of the involucre; and those of the *Salazaria* by a bladdery inflated calyx. While in none of these cases is the fruit buoyant enough to remain suspended in the air, it is sufficiently light to be blown along the surface of the ground by an ordinary wind. In other plants the stem breaks off as a base and the whole plant goes rolling over and over as a tumbleweed to scatter its own seeds. Other seeds have barbed bristles that catch in the fur of desert animals and are thus transmitted. The fruits of the *Opuntia* are all dry (though fleshy away from the desert), and are thus able to be carried by the wind.



Blue-and-white lupin (*Lupinus bicolor*)

The chief problem of desert plant life is that of ordinary growth. There is sufficiency of light and food, but moisture, both in the air and the soil, is deficient. "A plant absorbs moisture from the soil through its roots, carries it along its stem, and transpires it by evaporation from the stomata (breathing pores) of the leaves. Transpiration is an absolute necessity in the growth of a plant, for upon it depends directly the performance of several of the vital functions. If a plant of ordinary structure, such, for example, as red clover, were exposed to the climatic conditions of the desert, it would wilt, dry up, and die. To speak in physiological terms, the hot, dry air has caused more water to be transpired from the leaves than the roots can supply, the soft tissues have lost their turgescence, and the dependent vital functions have ceased. The first theoretical necessity of the plant is that the water it ab-

sorbs from the ground shall practically equal in amount that which it transpires. Desert shrubs accomplish this by the reduction of transpiration and by the increase of means for absorption."

I have already referred to the great roots of some desert plants. The mesquite roots extend enormously and can often be found fifty, sixty or more feet away. Yet "during the season of drought the largest amount of moisture that the roots can by any possibility absorb is comparatively small, and the greatest burden of modification must fall on the transpiratory system." A careful examination of many desert species led to the following conclusions. The leaves of desert plants are strikingly modified in size, form, and thickness. As a rule they are small, only six out of forty-one shrubs examined having leaves with a single surface area which exceeds one square centimeter (about half a square inch). There is no limit to the smallness of the leaves, for the *Cereus* and *Echinocactus* have no leaves at all, and in the *Ephedra* they are represented by scales devoid of chlorophyll and so constructed as to preclude the possibility of transpiration. In such cases all the transpiration is carried on by stem.

The creosote bush

In this connection it is interesting to note the peculiar leafing habits of the ocatilla (*Fouqueria splendens*). As I have elsewhere said, this "candle cactus" will lose all its leaves in hot, dry weather. At such times it transpires through the stem. On the first rain, even though the roots are barely wet, the plant immediately leaves out, undoubtedly for the purpose of affording it the opportunity for a period of leaf transpiration. Able to do without leaves when it has to, it leaps to avail itself of them at the first possible advantage.

The *form* and *thickness* of the leaves of desert shrubs are direct modifications for reducing the evaporating surface. It is surprising to the superficial observer to find the peculiar forms of

these leaves; all of them clearly adapted to resist rapid evaporation; and in all the forty-one specimens examined not one had a thin leaf.

Then, too, the early falling of the leaves of desert shrubs that have none of the special adaptations for preventing rapid evaporation, such as hairy, scaly, or resinous epidermis, is a special provision for their protection. The leaves grow rapidly during the spring rains and carry on most rapid transpiration, but when the intense heat comes they are unable to continue, and not being able to adapt themselves to a slower transpiration they dry up and fall away. In some plants the means for transpiration is in the epidermis of the stem, which is well supplied with chlorophyll to permit the assimilation of food.

Blue larkspur (Delphinium)

"In the majority of plants, however, the leaves remain on the stems during the greater part of the summer, carrying on their functions. To confine transpiration to that minimum which alone it is possible for a plant in such environment to support, the surfaces of the leaves are protected either by a resinous exudate or by a close covering of dry hairs.

"In *Larrea tridentata* (the creosote bush) is found the apparently simplest form of resinous coating. The leaves and small twigs are thinly spread with a covering that closely resembles in appearance ordinary shellac. To the abundance of this resinous matter the plant's popular name, creosote bush, is due, for in burning the green wood and leaves of Larrea a pungent odor is detected, and a dense smoke arises. That the function of the coating is to minimize transpiration, there can be no doubt, but the precise method by which this is brought about has not been ascertained. If it were simply by the complete mechanical varnishing of the leaf-surface, all transpiration would cease. It

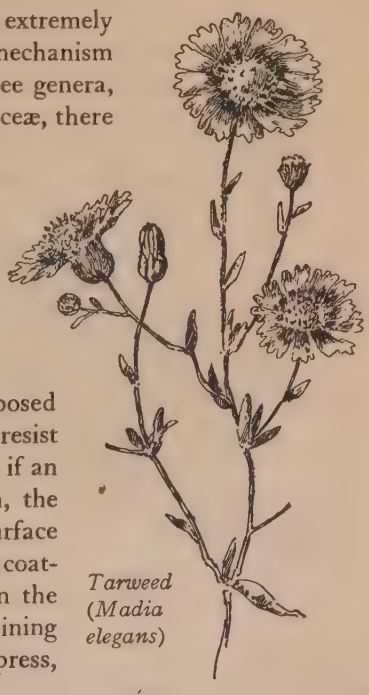
should be pointed out here that in winter, when we first became familiar with the creosote bush, its leaves were thoroughly varnished; but in June, when the spring growth had nearly ceased, the leaves appeared to have very little of the coating. There is in this fact an evident correlation between rapid transpiration and absence of resinous covering, and a similar correlation between slow transpiration and the presence of such a covering."

Resinous exudate, when it occurs on desert plants, is usually definitely associated with conspicuous glands. Some of these glands are on the surface of the epidermis or partly imbedded in the tissue. In some species the glands are confined almost entirely to the stem and branches, and are found only very sparingly on the leaves. In other species the glands are confined to the leaves. "These two types of the distribution of glands are seen at once to be correlated with the functions of stem and leaf. Plants which rely principally upon their leaves for transpiration have these organs more glandular than their stems, while plants in which the leaves drop off early, and which, therefore, are forced to transpire from their stems, have precisely the opposite provision." In some of these species the contents of the glands do not exude over the surface of the adjacent tissues, and therefore only a portion of the surface is protected by the exudation. This fact suggests strongly the idea that in such cases some other function than the mere mechanical sheltering of the transpiration surface must be ascribed to these glands. The elucidation of the problem is likely to be attained only by direct experiment.

Fourteen of the forty-one shrubs examined by Mr. Coville have a conspicuously developed hairy coating of the leaves or stems. These hairs are varied and individualistic, and the why of this is not yet fully understood. "The general important fact, however, is that from almost any form of trichome there may be developed, under a desert environment, a close hairy covering, so constructed as to greatly reduce the amount of heat transmitted from the air to the plant. In general the individual hairs of such a covering have no moist cell-contents, but are minute sacks or tubes of cellulose filled with air and closely felted together. The air contained in the cavities of the hairs and in the spaces between them constitutes an excellent non-conductor of heat. It is un-

doubtedly true also that the circulation of air through the interstices between the hairs is comparatively sluggish, and the extremely dry atmosphere is therefore admitted very slowly to the stomata and through them to the moist interior of the leaf."

"A few genera of desert plants, *Ephedra*, *Cereus*, and *Echinocactus*, carry on transpiration through their stems only, and are protected by neither glands, resinous exudate, nor hairy covering. In Ephedra transpiration is reduced undoubtedly by a thickened and extremely impervious cuticle, aided by the mechanism of the stomata. In the other three genera, all belonging to the order cactaceæ, there is likewise a marked thickening of the cuticle, together with a special modification of the interior tissues of the stem to retain water. If a leaf or stem of any plant not containing these water reservoirs be split, the organ is speedily desiccated, since the soft tissues exposed by cutting are not adapted to resist the drying effect of the air. But if an Echinocactus stem be cut open, the outer layers of cells on the raw surface become dry and form an artificial coating. With this slight protection the interior tissues are capable of retaining their moisture, even in the plant press, for several weeks."

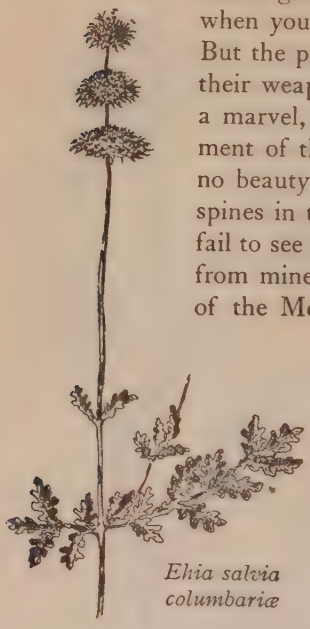


Tarweed (Madia elegans)

The vast importance and interest of this phase of the subject is my only excuse for making such lengthy extracts from Mr. Coville's interesting and lucid paper. He suggests many other phases of the subject that are yet in the process of elucidation, and to these suggestions those who are interested to go further are respectfully referred.

Another provision for the protection of desert plants is the fierce thorns with which they are garnished. Like the knights of

old, they sleep in their armor, which covers them from head to foot. And what armor it is! The thick and impenetrable epidermis is covered with thorns sharper than any needle and far more tough and strong. The various cactuses present a perfect arsenal of weapons to you, and bid you begone. But it is not as defense against man that they are thus panoplied. The desert animals are great "stayers" without water, and if they could get at these succulent plants, especially when young, they would find life an easy thing. But the plants fight hard for life, and these are their weapons. The thorns of the cactuses are a marvel, both in form and variety of arrangement of their stars. Let those who say there is no beauty in them look at the starry clusters of spines in the accompanying pictures, and if he fail to see beauty his eyes register very differently from mine. From the report of the scientists of the Mexican Boundary Commission I have taken these exquisite engravings, and several of them have been reproduced for this work, to give a true conception of the wondrous beauty of even the defensive weapons of these little known and seldom seen desert plants. Who can look, for instance, on the *Mamillaria pusilla*, with its dainty arrangement of these formidable spines, and not see wondrous beauty? And, in fact, every one of these plates is worthy a careful study from the esthetic standpoint alone. It will be noticed that some of the starry spine clusters have one, some two, some three central spines, one of which is generally hooked. These central spines give surer protection, for no animal can worm his way into the heart of any plant thus armored. Some of the spines are long, some short, some hooked, some are barbed, and some are so sheathed that when the thorn penetrates part of the sheath remains in the wound and festers.



Ehia salvia columbariæ

The spines of the *Echinocactus* add a color value also to their

From U. S.-Mexican Boundary Report

Cereus Chloranthus

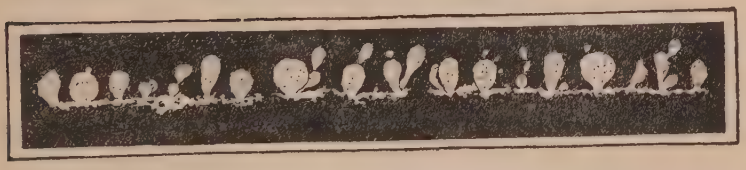
Mamillaria Tuberculosa

Cereus Cæspitosus

SPECIMENS OF CACTUSES

general beauty. They are ivory-like, with streaks of delicate pink throughout and across them. Compare the star clusters of the *Echinocactus horizonthalonius* with those of the *E. intertextus*. How different, yet how perfect in arrangement and how beautiful! Then in the *Cereus viridiflorus* an entirely different but equally classic and exquisite arrangement is given. When I see the labored efforts of the commercial designers, and think of the wealth freely offered by Nature in these desert suggestions, in cactus, lizard, snake, and animals, I am amazed at the ignorance and stupidity of those who prefer to work over old and insane conventional designs instead of striking out boldly by giving to the world these original conceptions of Nature.

As to the flowers of the various cactuses, there is nothing in the floral world, to my mind, that can equal them in fineness of texture, loveliness of color, and perfect grace.



Evolution of Indian dwellings

CHAPTER XV

The Indians of the Desert

SOME white men are naturally antagonistic to the desert. They fear, dread, and shun it. Its hardships and dangers, its perils and deaths, daunt and restrain them, and comparatively few ever venture into its secret and hidden places.

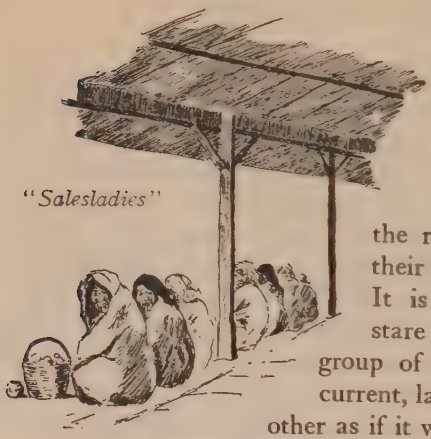
The Indians have no such dread. They do not complain of the desert's hardships. They have no fear of its perils. While they regard some things on the desert with veneration and awe, such as the rumblings heard near Tauquitch Peak, on Mount San Jacinto, and the noises caused by the wind in the rocks on Mount Palomar, they are familiar with everything on the desert at all times. It is their home, chosen for them by the gods, where they are bound to reside until their supreme guides lead them elsewhere. For the Indian is nothing if not reverent. His reverence may to us seem to be superstition, yet, all the same, it is real and sincere to him.

It will be impossible to devote as much space to a consideration of the desert tribes of Indians as I desire. I must leave the subject for fuller presentation in books which I have in contemplation.[1]

Below the Grand Canyon there are several tribes of Indians who live on the Colorado River. These are the Mohaves on the Fort Mohave reservation, and then a band of Chemehuevis, the latter being renegade Paiutis who found a home here many years ago when there was a famine in their own habitat. Below the Chemehuevis is another group of Mohaves, on the Colorado River reservation. Near Yuma are the Indians who gave the name to the city, and nearer to the gulf are the Cocopahs.

[1] These are in preparation. One will deal with the Indians in the Mount San Jacinto region and will be entitled "The Indians of Ramona's Country;" and the other will fully discuss the Indians of the Colorado River.

In the hot weather it is no unusual sight in the more secluded parts of the river to find a group of Yumas sitting in the mud with fresh mud on their heads, and one writer facetiously remarks that "by dint of constant dipping and sprinkling they manage to keep from roasting, though they usually come out parboiled. Strangers coming suddenly upon a group squatted in water up to their necks, with their mud-covered heads glistening in the sun, frequently mistake them for seals. Their usual mode of traveling down the river is astride of a log, — their heads only being visible. It is enough to make a man stare with amazement to see a group of mud-balls floating on the current, laughing and talking to each other as if it were the finest fun in the world. I have never tried this mode of locomotion, but I have an idea it must be delightful in such a glowing summer climate."



"Salesladies"

There are a few Cocopahs who now reside near Calexico, and until recently a village of the Dieguienos at San Felipe.

Indian dogs

The chief group, however, is of the Coahuilla tribe on the western side of the Coachella Valley, as far north as the San Gorgonio Pass, where, a few miles below Banning, the Potrero Village is located. Here are two hundred and twenty-five Coahuillas and Serranos — the latter being the mountain tribes, who have considerably intermarried. At Palm Springs (to the white settlement of which I have devoted a whole chapter) are twenty-nine Indians on three thousand

eight hundred and forty-four acres. Water, however, is scarce, and without water the desert land is useless.

Recently an inspector of the Indian department visited Palm Springs and proceeded forthwith to file upon all the unappropriated water of the region. When asked if he intended to take all the water his reply was characteristic: "I'm here for one purpose, and that is to look after the interests of the Indians. They are poor, downtrodden, and incapable of caring for themselves. I'll do all I can for them. The whites must look out for themselves."

Cocopah Indians, near Calexico

At Cabazon on six hundred and forty acres are twenty-eight Indians. They have no water and their land produces nothing, and were it not for the mountain plants and seeds found on the foot-hills of the San Bernardino these poor wretches would die of starvation.

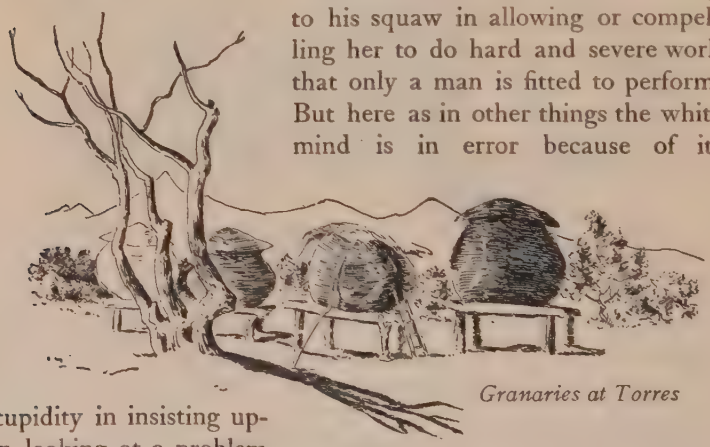
Below Indio are Torres, Martinez, Alamo Bonita, and Agua Dulce, all on the Torres reservation of 19,200 acres and with a population, all told, of 213. A reservation eleven miles long and varying in width from one to four miles, with plenty of water and exceedingly rich soil, is looked upon with envious eyes by not a few white men in Southern California. But let us

hope there will be no chicanery in dealing with this small remnant of a once powerful people. This reservation should be kept for them so long as there is a family to require it.

For many years the only water the Indians had was gained from surface wells they themselves had dug.

Potrero Indian reservation at Banning

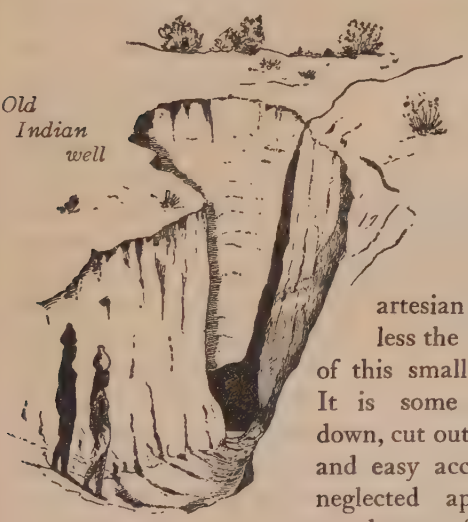
The earth was taken away from these excavations by the Indian women in baskets. They were, in the main, the excavators. To the white mind this is but another proof of the laziness of the Indian man, and his rude brutality to his squaw in allowing or compelling her to do hard and severe work that only a man is fitted to perform. But here as in other things the white mind is in error because of its stupidity in insisting upon looking at a problem concerning other people from its own angle of vision. The Indian woman laughs at the folly of the white reasoner. She says in explanation: "There are two kinds of labor, — man's and woman's. Man's labor is to hunt, to provide the food, and to fight, to protect the home. Woman's is to do all the work



Granaries at Torres

of the home. To provide water is woman's work. What though it means hard labor to get the water, Indian women are well and strong, and thankful to be well and strong. Those above give them strength and health. Do not white women want to be healthy and strong and capable of doing hard work? We do! We are grateful for our health and our strength. We like to use our strength, and we do not want our men to interfere in work that belongs to us and not to them."

Thus our pity is wasted, — bestowed upon those who scorn it, and whose scorn also is not undeserved when applied to those who would prefer to be dainty in appearance and "look nice," rather than be healthy, strong, vigorous, and capable of hard toil.



Old Indian well

But now the old Indian well is deserted. The labor of the past is forgotten. The new artesian wells have rendered useless the once priceless possession of this small pool of surface water. It is some fifteen or twenty feet down, cut out at one side to allow free and easy access, and now it has a neglected appearance. Brush and weeds grow freely around it, and the water that accumulates has a yellow appearance and is somewhat brackish to the taste, so that even the wild animals despise and forsake it.

This is not surprising when it is remembered that there are now ten artesian wells on the reservation. It is generally supposed that the first artesian well in the Coachella Valley was the one bored by the government on this reservation. This is an error. The Southern Pacific Company had first demonstrated the existence of artesian water at Mortmere and then at Mecca, after which the government set apart $2,500 for a well at Mar-

tinez. The expenditure of this sum is an example and evidence that the days of the unscrupulous politician are not gone by. Less than half, even a third, of this money would have secured the well, but the appropriation was all exhausted. Thus are the Indians robbed by scoundrel whites who are supposed to conserve their interests. The chief good, however, was attained. The securing of artesian water assured the material prosperity of these Indians, for with thrift and industry they can become more independent than many whites in less favored regions.

While all the villages of this reservation are of the same tribe, their inhabitants have not always been friendly one with another. Stories are rife among them that show that fights were not uncommon. The usual jealousies sprang up. Men of different villages went hunting in the same place at the same time and the women would go to gather wild seeds and find women from one of the other villages there ahead of them. These things engendered strife and quarrelings, and occasional slayings were not uncommon.

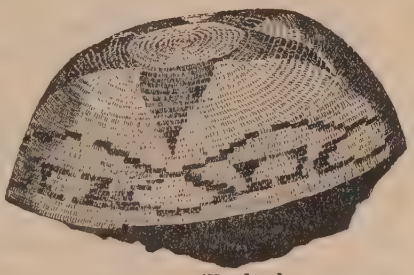
Indian boy on horseback

In various parts of the desert, scattered under clusters of mesquites, are numbers of pieces of broken pottery. Careful examination shows the major portion of these to have been large ollas. There was no evidence of any other than temporary habitation and no apparent reason for this. These locations were not on the line of any Indian travel to be used as camping places, and certainly no reason could be found for choosing such stopping places even if they were on any trail. For a long time I was puzzled to account for these places, until at last I was informed that they were used by Indians of the Yuma and Cocopah tribes, who, long ago, occasionally made raids on the mountain tribes. Their squaws accompanied them, and, as these raids were generally made in the hottest seasons of the year, the large ollas were filled with water. The squaws then

settled themselves down under the chosen location of mesquite, keeping the ollas filled, while the warriors went on ahead and perpetrated their designs of murder, rapine, theft, and destruction. Then, rapidly retreating to these spots, they rested awhile, knowing full well that the mountain tribes would hesitate at following them into the desert at such a heated time. Thus the crafty and heat-resisting Indians of one tribe preyed upon the fear of another tribe and their known dread of venturing upon certain parts of the desert in very hot weather.

In the remaining portion of this chapter I shall confine myself to the village of Martinez.

The only native officials are a *capitan* and *alcalde* — a captain and a judge. These the Indians are allowed to elect themselves, subject, however, to the veto of the Indian agent. Generally the election takes place in June, and the officer elected serves for one year. The capitan for this year is Poncho Lomas, and the alcalde is Francisco Nombre. It may be interesting to note that Francisco has four generations of married children living, so that he certainly cannot be accused of failing in his duty to replenish the earth. Captain Poncho informs me that the original name of his people was *E-vā-āt*, which signifies *people*. They came into the desert from over the San Jacinto Mountains, though originally, "in the beginning," as he put it, they came from the East. They were traveling many days, and all he knows of the journey is that his people were naked and had little to eat, having to subsist on pinion nuts, prickly pear, and wild grass seeds, with the few animals they could snare.



A Coahuilla basket

Those who settled in this spot found the surface water which led to the digging of the well, and there were many mesquite and other good things to eat that grew profusely. The mountains were close by where there was an abundance of game, so they settled here and were content.

Then the waters rose on the desert and drove them forth, and they ascended Martinez Canyon, toward the village of Santa Rosa, and lived there for many years, catching fish from the inland sea. The water remained for many, many years, and it was during this time that they made the so-called fish traps found on the level of the ancient lake beach. These traps are rudely circular in shape, and are simple depressions, surrounded by a wall of granite. They are from two and a half to nine feet in diameter, and give the impression that they were built out at low tide, so that as the water came in fish would enter and be caught. They may, says Major Rust, have been pens for holding fish that the Indians had caught. Then the water receded and the Indians slowly came down from the mountains and took up their residence again in the valley.

Indian pony

When the water first went down the land had very little on it, only a few grasses, and the people did not have much to eat. Then the grasses grew more plentifully, and soon the prickly pear and the mesquite came and then all was well. Those were the prosperous days. Every one had plenty to eat, they got fat and grew fast. "Ah," said Poncho, "when people have little to eat and they are small and thin, they grow slow. It takes a boy with little to eat long years before he becomes a man, but when he can eat much he becomes a man pretty quick."

Poncho's son Augustin is a farmer of no mean order. He has seven acres of barley, half an acre of onions, and three or four acres of cantaloupes as well as a good stand of alfalfa for feeding his horses. Besides attending to these horticultural and agricultural operations he is the chief partner in a hay-baling machine which the white men of Coachella Valley keep busy during the baling season. He is also a shipper of wood to the city markets. He engages the men of his tribe to cut mesquite wood and deliver it to him at the railroad for a certain price, on a given date. At that time he has a car there ready for loading, into which the wood is directly placed from the wagons, so that it is immediately ready for shipment. In addition to these sources of in-

come he is the interpreter of the little mission church, and he has learned the art of barbering.

The population of Martinez is 320, men, women, and children. The men are generally well employed, attending to their own well-cultivated and fairly prosperous farms. When their own work permits they go out and work at various occupations in the valley. Some are farmers, others prune trees, — and at this they are skilful, — pick fruit, pack fruit, some are machinists, and not a few work on the railway as section hands.

Land is held in community. All members of the tribe, male or female, who wish to use land may make application for it. A council is then held, and the land apportioned according to the judgment of those concerned, and the agent then confirms or alters the apportionment according to his own judgment. The amount of land on the reservation would allow each Indian to have sixty-two and one-half acres, but for some reason or other the agent restricts the allotment to ten acres.

Indian horse

The Indians now have very little stock (about two hundred and fifty head in all), and what they have is kept in fenced fields. When it was allowed to run wild there was constant friction between the Indians and the few whites who had located in the desert. The latter contended that the horses and cattle of the Indians ate and trampled down their grain, destroyed their gardens, ruined their irrigation ditches, and they would impound the offending animals and refuse to release them until they had been paid the sometimes unreasonable and unjust claims they made for damages. It can be well imagined what confusion and irritation arose from this course of procedure. As white men came into the valley in large numbers, the Indians seemed to realize that discretion was the better part of valor. With the best grace they could they submitted to the inevitable, sold the major portion of their stock, fenced their lands, and thus kept up the balance, so that there is little annoyance on either side in this regard.

At one time they had over one thousand burros, but few are now left. The way they were defrauded of their burros is another evidence of the superiority (!) of the white man. During one of the spasmodic mining excitements that now and again thrill Southern California, a few "clever fellows" bethought themselves of the burros of the Coachella Valley Indians. They were in great demand, for a prospector without a burro is as unthinkable as Othello without Iago or Desdemona. These rare specimens of the "superior race" built a pound or corral not far from Martinez, and then coolly proceeded to capture all the burros they could find, running wild over the desert or in the near-by canyons. They succeeded in capturing several hundreds which they then drove off and sold to the would-be discoverers of gold mines, in Los Angeles, Riverside, Redlands, and San Bernardino. Thus again was the superiority of the whites over the reds demonstrated, for the former got the burros and also the money for their sale.

Indian burro

A stout, well-built Indian named Anastasio is the chief medicine-man. But he feels that his art is on the wane. The medicines of the missionary, the things purchasable at the store, the prosperity brought by the artesian water, all help to render his services less necessary, so little by little the importance of his functions is disappearing and soon, like so many things of "the old," his office will become a mere name, a thing of the past.

Indian granary

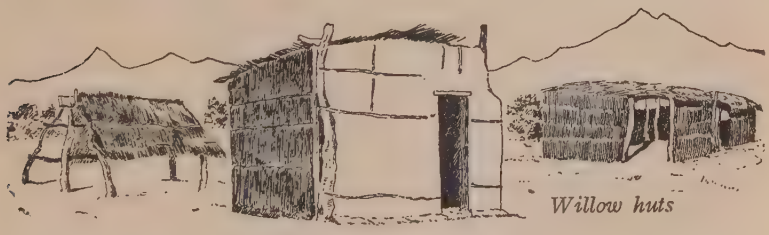
Their native houses are called *kish*, and are built of a framework of strong poles, — mesquite, cottonwood, or willow, — into which are worked in a variety of ways willows, arrow-weed, palm leaves, etc. Sometimes the filling-in material is rudely

woven or wattled; again it is stacked in upright layers held in place by crosspieces, one inside and one outside the *kish*, tied to the upright poles, and fastened to each other by buckskin or yucca fiber thongs. In two *kishes* that I saw there was a success-

Brush shelter

Evolution of Indian dwellings

ful attempt at beautification by tying small bunches of willow or arrow-weed together and then placing the bunches side by side, and fastening them in place by the crosspieces as before described. The tying of the weeds together makes a marked improvement in the appearance of the dwelling.



Willow huts

Evolution of Indian dwellings

As is found in most aboriginal dwellings in the hot Southwest, the desert *kish* is provided with a rude porch, called *al'-a-nut*. This is generally large enough to be a valuable acquisition to the *kish*. It is often larger than the hut proper, and serves as a place

for working, cooking, eating, social intercourse, and indeed, winter and summer alike, for every purpose except sleeping and storing goods.

It is a rude, primitive affair, a mere shelter, open on three sides, supported by poles and covered with arrow-weed, willows, or palm leaves, and, during the few scant rains, made as waterproof as is necessary by throwing on a few loads of earth which the palm leaves do not allow to sift through. Here and there a white man's tent, *kar'-pa*, is seen, and one family lives in an adobe house with a most pretentious adobe chimney, while the captain, Poncho Lomas, lives in a composite dwelling, the kitchen being of lumber, and the sleeping-rooms the ordinary willow *kish* of the aborigine.

In one style of house the arrow-weed is used with good effect and picturesque appearance. Small bunches of the weed are fastened by a cross-pole to the upper portion of the house frame. The butts of the weed are upward, and the tips downward. These are then plaited together in neat and regular fashion, new weeds being introduced as required, until the whole side of the house is completed. Here, then, is a house of basketry. It keeps out the sun and rain, and breaks very materially the force of the wind.

Who knows what fetiches are hidden in the shadowy recesses of these dwellings, — the charms to keep off the witches, to prevent the bats flying into the rude houses and sucking away the breath of the sleeping inmates at night, to keep lizards and horned toads from creeping into one's belly and giving terrible cramps, to keep the Evil One out of the stomachs of pot-bellied children at corn and melon time, to keep the rattlesnakes from biting, bears from hugging, mountain lions from leaping upon one, to ward off sidewinders, and the harm that comes from the hoot of the owl at night? What a *mélange* of charms and amulets one would need to give one a good husband or wife, to procure long life, to determine the sex of the unborn child, to make the barren woman bear, to produce a flow of milk, to make the sheep and cows more prolific and add to the number of the horses, mules, and burros, to make the corn, melons, and onions grow, to give one a sweet voice, to win the love of a shy and timid maiden, or to compel the caresses of a wilful and strong-minded man, —

Photo. by C. C. Pierce & Co., Los Angeles, Cal.

COAHUILLA INDIAN AND GRANARY

ah, only those who know the real inner heart, the real superstitious life of the Indian, can dream of the number of these strange things hidden in a village like this.

The Coahuilla Indians do not have many native arts now left to them. They still make a few baskets, however, their work being of fair quality. A few weavers do excellent work. In all there are now thirteen women who do basket-making with some degree of regularity. Careful inquiry among them has so far failed to find any weavers who use any symbolism in the designs of their baskets. One or two weavers imitate birds, reptiles, etc., such designs as those of the eagle, turtle, lizard, and butterfly being not uncommon, but many other designs of evident vegetable origin are said to have no meaning, and are used merely "to make the basket look pretty."

A Coahuilla squaw

The Coahuillas make a rude pottery in somewhat similar fashion to that of the pueblo tribes of Arizona and New Mexico. They find the clay in the mountains, soak it, and then pound and puddle it with round rocks. As soon as it is properly worked, the pottery-maker takes a piece of the clay, rolls it out into a long rope, and then begins her coil just as if she were making a basket. One coil is laid upon another, and the two are pinched together, then smoothed out with a small bone, wood, or gourd-shell paddle. When the vessel is complete it is dried in the sun for a short time and then put in a fire of mesquite wood. Burning is a difficult process, and requires watching closely. Sand is thrown upon the fire when it seems to burn too rapidly.

While the morality of the Martinez Indians is good, there are cases that arise occasionally that require considerable care in the handling. For instance, the alcalde of 1905 had a family of six children. In addition he cared for his father and mother. Near the end of the year the husband of his oldest daughter died, leaving her with four children. This daughter and her

children came home, thus making in all a family of twelve for the alcalde to care for. His second daughter was about twelve years of age, not yet having come to puberty. She felt the burden her father was bearing, and when a young man of some eighteen years offered her a home, she accepted it, and went to live with him. Her father could not persuade her to return and he went to see the missionary about it, who at once communicated with the Indian agent, and also his own superintendent whose word has great power with most of the Indians of this reservation. Immediately letters were received from the agent and superintendent, the former demanding the immediate return of the girl to her home, and the other suggesting the same thing. Though very angry, the young man deemed discretion the better part of valor, especially as he was informed that if he were patient for a couple of years, and the girl then wished to marry him, all objections would cease.

Indian dogs

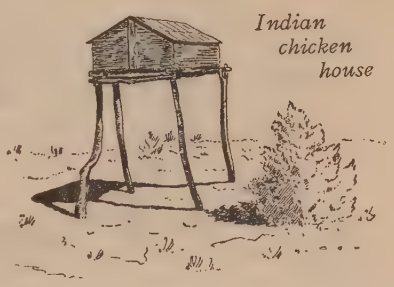
Tattooing used to be universal among them. The thorn of the mesquite tree was used to make the puncture, after which the bruised leaves of the same tree were rubbed into the holes until the juice soaked in. Then the juice of the leaf was forced into the flesh by making the puncture deeper. The color thus produced was a very deep green. A few of the older men and women are still found bearing the tattoo. Others have removed it. They inform me that the marks are effaced by repricking them and letting out the blood. As soon as the pricks heal the color disappears.

Indian dog

A study of the native plants, grasses, seeds, roots, and fruits used by the Indians as food and medicine is most interesting, and Dr. D. P. Barrows has gone over the ground in a fairly exhaustive manner in his "Ethno-Botany of the Coahuilla Indians." Here are a few additional facts.

One of the chief plants used for medicine is the *metch-o-wol*. Its leaves are supposed to be efficacious in curing sore throat, and an infusion from its root is considered good for a cold. The leaves are taken and well soaked in a pan of boiling water. Then the patient kneels down with his head over the pan containing the infusion. A blanket is thrown over the head and then a red-hot rock is dropped into the liquor. The steam is thus breathed in through the mouth and nostrils and the sore throat soon disappears.

The root is cut into pieces about the size of a lima bean, and then boiled for twenty minutes to an hour. The patient drinks a spoonful or so of the infusion every hour. While the older people still believe in the efficacy of these medicines, the young ones are unanimous in pronouncing them "no good."



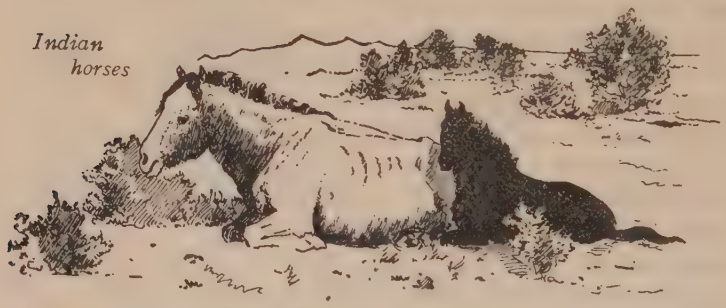
Indian chicken house

In the same category of uselessness they place the sweat-bath of the elders. This is taken not oftener than once a month, and never by the young. A small hut is kept for the purpose. It is a rude frame covered with mesquite bark, fan-palm leaves, mud, etc., to make it retain the heat. In the center a fire is lit and when the heat is intense two or three persons in a nude condition sit down around the fire until they perspire freely. When they come out they wrap themselves up in blankets and lie in the hot sun, still sweating, and when by and by the sweating ceases and the body is dry they wash themselves off with hot water. For soap they use the leaves of a plant called *seh'-wel*, which, when bruised and rubbed in hot water, produces a fine lather. In washing clothes the *sehwel* leaves are not only rich in saponaceous qualities, but they help whiten them, having an effect somewhat similar to that of bluing.

With these Indians, as with us, medicine and medicine-men alike often fail to heal, and death ensues. They bury their dead after a ceremonial of wailing that is as piteous as it is pathetic.

The wail of mourners on the desert seems to have greater potency than elsewhere. Shrill and loud, it seems to pierce the stars and reach to the far-away edges of the wilderness, striking the mountain slopes with its wild frenzy and falling back in slightly diminished power to echo and reëcho among the cliffs and up the canyons. The Indian wailing for her dead! It is the articulate voice of sorrow of the ages, the cry of the aborigine against the unbearable hand of Fate.

While there is little or no music in the conventional wailing of the Indians, there are times, both of sorrow and of rejoicing, when they indulge in their primitive music. At such times I feel as if I were being taken back to the very beginning of the world. These simple and primitive songs bring before me



Indian horses

Abraham and Isaac and Jacob and Noah and all the Hebrew patriarchs. I can imagine such songs being sung when the flood came, and when the ark finally settled on Mount Ararat and the family of Noah came out of the ark. It is a wonderful thing to hear primitive music, sung in primitive fashion, by a primitive people when they imagine themselves alone.

The mesquite bean, *men'-a-kish*, and screw bean, *queen'-yl*, are two of their chief articles of diet. The granary in which their supply is stored is made of willow and arrow-weed and is called *pen'-a-vat*. These granaries are three and four feet in diameter, and are generally made by the men. They stand about two and one-half to three feet in height and are placed on platforms, in order that predatory animals and vermin may not get to their contents.

To make a food or drink of the beans they are pounded in a wooden mortar, generally made from the trunk of a tree, hollowed out as far as needed with a stone axe. As soon as the beans are pounded into meal, this is sifted through a basket screen. The flour is then put into a basket or pail and water sprinkled over it, where it remains for two or three days. By this time it is hard and ready to eat.

For drink the flour is soaked a few minutes, the liquor, *ka'-hat*, is then poured off and drank. It is never allowed to ferment.

For candy, *pah'-vas-ni-at'*, the flour is especially chosen from well-ripened beans and ground exceedingly fine. It is made the same as the bread.

In preparing barley for food they dampen it a little, pound it in a mortar, and then, placing it in a saucer-shaped basket, shake the basket and toss the barley up and down with a peculiar circular motion. Soon the hulls are edged off and drop to the ground, while the grain is gathered together toward the operator. It is an interesting process, for the dexterity of movement is remarkable.

It is only within comparatively recent times that we have learned of the rich treasure-house of legend, myth, and story the Indians' memory is. These stories have been handed down from the "old times," and reveal the mental processes of the Indian as nothing else can.

Captain Poncho gave me the following Coahuilla story of the advent of man and of the creation of the earth: "In the long, long ago, before the world was created, there was nothing but darkness and lightning. For a long period of time it would be all dark, and then suddenly, with flash and zigzag, the fierce brilliancy of the lightning would strike through the darkness. Once these flashes and zigzags struck so often that they formed an egg, which grew bigger and bigger until it was fully as large around as a big man is tall. There were two babies in that egg. There was nothing to hold up the egg but the air, yet it floated until the babies grew bigger and bigger, so that they knew things. When they were old enough to know things they thought they would break their shell and come out, and one of them did so. As soon as he broke his half of the shell and

emerged, he exclaimed, 'I'm the oldest!' The other said, 'No! I'm the oldest! But if you are older than I, go ahead and make something for us to stand on. We can't float around here in this rotten egg-shell forever and by and by it will give way and we shall sink and sink until we go nowhere and that will be the end of us.'

"'I shall not obey you,' said the first one to emerge. 'You are younger than I, so you must do what I tell you!'

"'No! You are the one to do it because you claim to be older than I. You make something to stand on. The fact is, you can't make anything!'

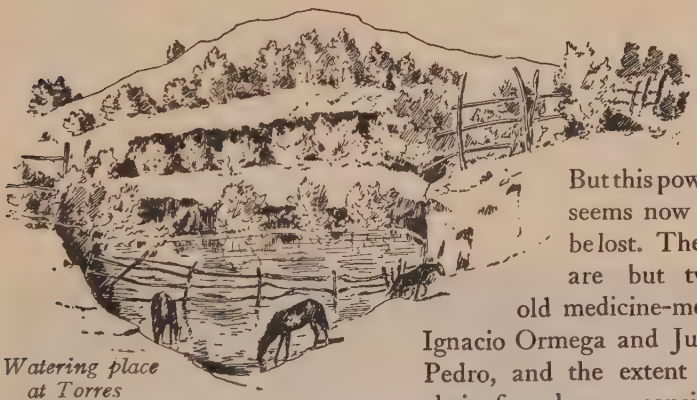
"This taunt angered the older one, so he exclaimed, 'You think I cannot make anything. I will make the earth;' and he at once proceeded to make the earth and the people to live upon

Corral at Martinez

it. But there was no sun and no moon and everything was dark and the people cried for light. So the older said to the younger, 'Make some light for the people to see by,' and the younger one made the stars. But that was not enough. They gave but little light and the people cried out for more light. Then the older one said to the younger, 'Your light is not enough. Make more.' So in obedience the younger made the moon. But there was still not enough light, and when the people complained the older said to the younger for the third time, 'Make more light!' This time, however, the younger brother refused. He said, 'I have made all the light there is, and I do not intend to make any more. You command me to make the light because you don't know how to make it yourself.' This taunt made the elder brother fiercely angry and he cried out, 'Do I not know? Look!' And with a swift stroke of anger he created the sun, which has ever since made light for the whole world.

"The younger one recognized his brother's power, but consoled himself by saying as he walked away, 'Well, he would never have made such a great light as the sun, unless I had first showed him the way.'"

In the early days the Martinez Indians used to have a fire-dance. A few of the medicine-men made a large bonfire, around which they danced in an almost naked condition, singing the while their songs and incantations. When the flames died down and only the bed of incandescent coals was left they walked right into the center of the hot mass and remained there for several minutes, suffering neither injury nor inconvenience therefrom.

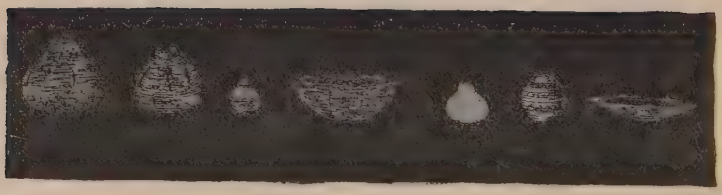


Watering place at Torres

But this power seems now to be lost. There are but two old medicine-men, Ignacio Ormega and Juan Pedro, and the extent of their fire charms consists merely in taking live coals into their mouths and then breathing out flames and smoke. Occasionally a fire-dance is now given, but as both the priest and the pastor of the Moravian mission are opposed to it, and most of the people attend one church or the other, the dance has fallen into disrepute and will undoubtedly soon disappear.

On the map, to the southwest of Mecca, will be noticed the name Fig Tree John's. This is the home of an Indian who receives his name from the fact that he has a number of fig trees planted around the springs upon which he has been located for many years. The water has demonstrated the rich fertility of the soil and his trees have grown until they are large and bear well. Thirty of his trees are fully thirty years old, and he has a smaller

orchard of younger trees. He claims to have started the orchard himself from the cuttings of a tree which he found at some deserted settlement. His figs are among the finest and earliest in Southern California, and are about the size and shape of a turkey's egg. They ripen early in May, and in the Los Angeles market they bring about twenty-five cents a pound. The figs on my own trees at Pasadena this year, 1906, did not ripen until the middle of August, so that the advantage of Fig Tree John's early shipments will be evident.



CHAPTER XVI

The Stage Line Across the Desert

RESISTLESSLY progress marches in every new country where the Anglo-Saxon sets his foot. The Army of the West crossed the Colorado River from Yuma to San Diego in 1846 to find California already enrolled under the United States flag; the battle of San Pasqual was fought December 6 and 7, 1846; P. St. George Cooke, with the Mormon Battalion, came through a month later (in January, 1847) and gave his name to Cookes Wells; gold was discovered next year, January 24, and by the end of 1848 the world's gaze was turned to the new Eldorado. In 1849 the real exodus began, and, as Sonora was nearer to California than any other well-peopled country, the Sonoranian emigration was the first in the field. For three-quarters of a century California had held direct intercourse—more or less frequent—with Sonora and the route was fairly well known, by way of Tubac, Tucson, the Gila Valley, across the Colorado River and the Colorado Desert, either to the mission of San Diego, over the lower road, or to the mission of San Luis Rey, through the San Felipe Pass, while a third road went up by Indio and Palm Springs, over the San Gorgonio Pass, to mission San Gabriel.

From 1850 to 1853, J. R. Bartlett was engaged in determining the boundary line between Mexico and the United States, and he fully describes the route from San Diego to Yuma by way of San Pasqual, Warner's Ranch, and San Felipe, thence by Cameron Lake to the Colorado River.

In September, 1853, Arizona was purchased from Mexico, under the Gadsden treaty; in 1853–54, Jefferson Davis, then Secretary of State, ordered a survey of the country west of the Mississippi in order to find the best railroad route to the Pacific,

and in accordance with his instructions Lieutenant Williamson and his aids made surveys of the country from Los Angeles south to San Diego and from both points to Yuma, thus covering the southern and the San Gorgonio Pass routes over the Colorado Desert.

In 1854–55 the new boundary survey was made, including Arizona, by Major Emory and Lieutenant Michler, and when Arizona mines began to be developed, as they did about this time, the slow methods of wagon transportation were found inadequate to meet the needs.

During the whole of this period immigration travel was desultory and irregular, people coming in with their own wagons and generally returning by the Isthmus.

An early-day stage-coach

In August and September, 1857, the San Diego and San Antonio semimonthly stage line was established, under the direction of I. C. Woods. James Burch was contractor. This continued in spite of the bad habit contracted by the Indians of personally undertaking to distribute not only the mails, but the dead bodies of the mail carriers, the mail coaches, and the stock, over the plains, and the occasional playful acts of impaling the station keepers with arrows and spears, and burning the stage stations.

But the pressure upon Congress now was so great for a regular mail service to California that one of the last acts of the Congress sitting at the termination of the Pierce administration was to

authorize the Postmaster-General to establish a postal route between the Mississippi River and San Francisco, California, for a period of six years. Advertisements were published asking for bids, but limiting the amounts to not more than $300,000 per year for semimonthly, $450,000 for weekly, or $600,000 for semiweekly service. The bids were opened on the first of July, 1857. There were nine bids in all. It was decided not to use the northern routes, as the Post-office Department already had had large and distressing experiences on those routes owing to snows. As for instance, the mails for November, 1850, by way of Salt Lake, did not reach their California destination until March, 1851, owing to the unprecedented falls of snow in the Sierras that winter.

On the second of July, 1857, the Postmaster-General accepted the bid and made the order for the route "from St. Louis, Missouri, and from Memphis, Tennessee, converging at Little Rock, Arkansas; thence via Preston, Texas, or as nearly as may be found advisable, to the best point of crossing the Rio Grande above El Paso, and not far from Fort Fillmore; thence along the new road being opened and constructed under the direction of the Secretary of the Interior, to Fort Yuma, California; thence through the best passes and along the best valleys for safe and expeditious staging, to San Francisco."

It took a year to get the line in operation and on September 15, 1858, the overland letter mail, in four and six horse and mule coaches, left St. Louis and San Francisco simultaneously on their long trip across the country. The schedule time was twenty-five days, three days less than that of the ocean route by way of Panama.

The line was finely equipped, there being over 100 specially constructed Concord coaches, 1,000 horses, 500 mules, and 750 men, of whom about 150 were employed as drivers.

The fare was $100 in gold for each passenger, whether he were a Tom Thumb, a Falstaff, or a Daniel Lambert. Six passengers went through from San Francisco to St. Louis on the first stage, and their arrival at St. Louis was considered a great public occasion. In San Francisco the rejoicing was on a gigantic scale. The long-hoped-for, dreamed-of, and desired

overland mail was now a reality and the pioneers showed their joy and appreciation in a great round of festivities.

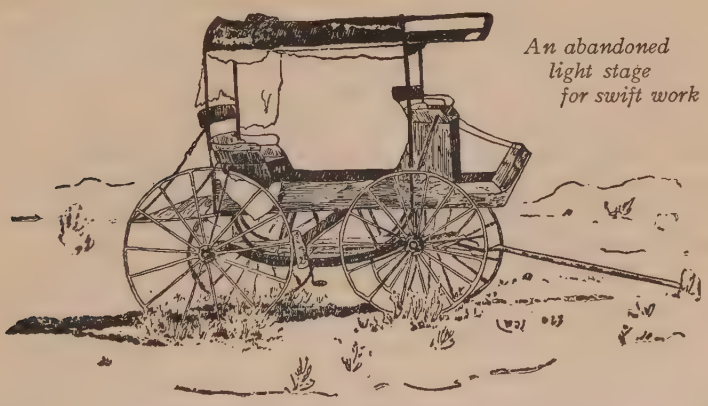
The line was known as the "Butterfield Overland Mail."

It was the longest continuous line ever organized and the best operated. It ran twice a week, under a six years' contract with the Postmaster-General, at a subsidy of $600,000 per year. Considering the difficulties, it was one of the most wonderful private enterprises of history. To span the continent, and in so doing ford treacherous rivers where changing quicksands made every trip dangerous, and floods often carried away horses, coaches, and drivers; traverse barren, sandy deserts where water and feed had to be provided for both man and beast, and where moving sand-hills, heat, and storm often rendered travel impossible; cross towering mountains where, in winter, deep snows buried roads twenty, fifty, and even a hundred feet out of sight; through marshy quagmires where miles of road had to be constructed of corduroy; through dense forests where wild animals lurked; and where, from one end to the other, the sole reliance was upon the grit and nerve of man and the endurance of horseflesh; in spite of a score of hostile tribes, all of whom seemed to concentrate their efforts to stop this new movement of their white foe, — I say to span the continent, a distance of nearly two thousand five hundred miles, in twenty-four and, later, twenty-one days, was a feat of which man might well be proud. That it ran well is evidenced by the fact that the Los Angeles *Star* records that it came in ahead of time, and had flaming head-lines calling for "A Hundred Guns for the Overland Mail, Twenty Days from St. Louis." But as J. M. Guinn says: "The sleepy old city could not keep awake. The next issue of the *Star* says: 'The Overland Mail arrived at midnight. There was no one in the post-office to receive it, and it was carried on to San Francisco,' to be returned six days later, with all the freshness of the news gone." The route from Los Angeles was by El Monte, Temecula, Warner's Ranch, Vallecita, and Alamo Mocho to Yuma.

The roads over which the stages traveled were all natural. There were no "made" roads, save in a few isolated places over steep grades, or where a marsh had to be "corduroyed."

And it is the same on the desert to-day. As soon as a road becomes too deeply rutted or too muddy, the driver strikes out and makes a new road for himself, and the result is some regions are cut up with diverse roads all made during a period, say, of wet weather to avoid too much mud, or some peculiarly bad place.

While the Butterfield line was in successful operation, running its biweekly stages, a monthly mail line was plying between St. Louis and Salt Lake, and it was soon to become the main line and the forerunner of the first overland railway. Trouble with the South was pending and finally the Civil War broke



An abandoned light stage for swift work

out. Almost immediately the Butterfield line went out of commission.

The Confederates levied on all the stock, etc., on the east end of the line, and the Apaches and other Indians, who had been making constant endeavors to drive the stage-coach line out of the country, seeing the change in affairs, even though they did not understand the cause, seized the opportunity and stole all the stock and furnishings, burnt and pillaged the stations and as far as possible wiped out every vestige of the Overland Mail at the western end.

On the twelfth of March, 1861, the southern overland route was ordered discontinued and a bonus of one month's extra pay given to the contractors. St. Joseph, Missouri, was selected as the

starting point for the new line, and it operated as the "Central Overland California and Pike's Peak Express" (abbreviated to C. O. C. & P. P.), via Atchison, Kansas, Salt Lake City, and Placerville, California. July 1, 1861, it went into operation as a *daily* line, and thenceforth the southern line was practically abandoned. For in 1863, when J. Ross Browne was invited by Charles D. Poston, the first Indian agent for Arizona, to go from Oakland with him on a trip through Arizona, they had to rely upon personal conveyances, though the government supplied an escort of five soldiers and an officer, as well as mules for the ambulance and rations for the soldiers.

At the close of the war, when matters were more settled, a freight and passenger service was organized by the Hooper-Whiting Company of Yuma. Vessels plied between San Francisco and other California points, and sailed into the Gulf of California and thence up the Colorado River to Yuma. For many years the main bulk of supplies for the Arizona miners and those located on the river above Yuma came this way and stage service on the southerly route, by Warner's Ranch, was desultory and finally abandoned.

In 1872 the stage from Prescott to Los Angeles came by way of Ehrenberg, Chuckwalla, Indio, Palm Springs, and the San Gorgonio Pass. P. W. Dooner, who came to Los Angeles in hat year by stage, tells of his first stop on the desert at Chuckwalla. This was then, says he, "a station where refreshments and lodging are supposed to be furnished. The place was just about as classic in its surroundings as the jingle of its name would suggest. We came upon the scene at a moment when all the indications pointed to a recent domestic calamity. We were informed by the driver that the occupant was blessed by an Indian wife, taken according to Indian rites, and that unhappy differences of opinion had agitated the domestic hearth within the period of twenty-four hours which had deprived the establishment of its mistress, and which would materially affect the accommodations of the place. A notice which had just been posted in a conspicuous place upon the outer front wall of the family hut gave the only other information that we could gather concerning the family trouble. This was scrawled in plain but

uncouth letters — Roman and script intermixed — and was carefully copied into my diary. It reads as follows:

"'NOTICE: — An oldish squaw about 30; blind in one eye — the left one; a slight halt in one leg; a thoroughbred. She has abandoned the ranch, and any one who will get her back will receive two sacks of mesquite beans.'

"We were detained here for some four hours, and up to the time of our departure no person had come to claim the proffered reward.

"From Chuckwalla westward was the usual desert journey, undisturbed by incident, but still an experience that must have been undergone in order to be appreciated. No words can convey an adequate conception of the desolation of the mid-desert region. The stillness and silence are unbroken by any motion

Later-day stage-coach

or sound except it be the vibration of the palpitating air under the torrid heat, or the voice of the driver as he urges the weary mules to renewed exertion. In one direction the view is swallowed up in the mirage, or exhausts itself over an endless expanse of sand, and in the opposite direction a reddish brown sandstone bluff rims the horizon. Of indigenous life there is none at all — nothing but sky and sand and sweltering heat. One might reasonably suppose that the twilight hour would bring some relief from the oppressive heat, but, while the temperature of the night may have been much lower than that of the day, there was always some compensating influence in the atmosphere of the night that made such change hardly, if at all, perceptible. The night breeze, if such there happened to be, was invariably so warm as to make it much more comfortable to screen the face from its contact than to invite exposure to its

biting influence; while, in a calm, the constant radiation of heat from the burning sands of the preceding hours of day maintained the atmosphere at a temperature always above the normal heat of the body."

As is recounted in other chapters the old stage stations of the desert still stand, some in ruins and deserted, others used as ranch-houses or present-day stopping places for miners and prospectors. Many are the stories that travelers tell as to what occurred in the old days at these stations.

A lady friend of mine, the wife of a former U. S. Army officer, once took the journey from San Francisco to Tucson. She well remembers stopping at one of the stations on the Colorado

Modern visitors on the desert

Desert after the Indians had made a raid and cleaned out the commissary department. The meal had to be cooked and served by the station-keeper, and as he came to the table with a battered, grimy, and unclean looking coffee-pot, and stood at her elbow, he asked, "Will yer have coffee, tea, cocoa, chocolate, or milk?" Then apparently as an afterthought he exclaimed, "Yer'll have to take coffee, damit, for that's all there is."

Mr. J. L. Vosburgh, of Los Angeles, came from St. Louis, Missouri, to Los Angeles, California, on the Butterfield stages. Said he in a recent conversation: "Those were strenuous days for travelers as compared with the ease of Pullman travel to-day, but all hardships and inconveniences were taken, as a rule, in the spirit of fun. We looked upon them as fit subjects for jokes, and the

travelers who complained and whined were generally either guyed unmercifully, scored by the driver, or left severely alone. I well remember stopping at one station, the keeper of which shall be nameless. We found him in an awfully disagreeable mood. The stage-driver 'jollied' him a good deal, without removing the dark pall of gloom and moroseness that had settled on his countenance. He had warned us beforehand to look out for 'fun' when he mentioned 'cats.' Accordingly when he asked, 'How's your cats? All gone?' and received no reply, and then turned to us, and, with a merry twinkle in his eyes, assured us that 'H—— shoots all the cats he can find and serves them up to poor hungry travelers as rabbits,' we were all alert for something, we hardly knew what. But we were not prepared to see H—— reach for his revolver, and with a curse for his tormentor seek to shoot, which he certainly would have done, had not I, who happened to be nearest to him, taken the revolver from him. It afterwards transpired that the poor fellow's daughter had that day run away with a Texan without saying, 'By your leave,' or 'Give me your blessing,' and he was in no joking humor."

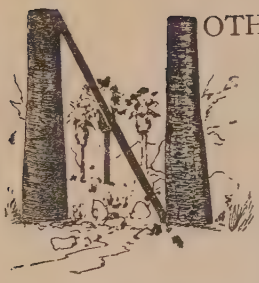
Mr. Vosburgh then told of another trip he made from Yuma over the sandy wastes where he saw the heads and horns of a large number of cattle sticking out of the drifted sand. A cattleman had started with a band of six hundred fine steers for the Los Angeles market from Southern Texas. It was a long, hot drive to Yuma, but having reached the Colorado River and crossed it in safety, though his animals were very weary, their owner had begun to congratulate himself that the worst part of the journey was over. A few days later he was able to tell another story. The desert had tried the poor creatures fearfully and they were compelled to camp one evening without water. The herders comforted themselves with the assurances that they had received that they would be able to water before noon the next day, and themselves stretched out to rest, as the extreme exhaustion of the wearied cattle satisfied them that there was little fear of a runaway or stampede that night. During the late hours a sand-storm arose of such dreadful fury that every effort of the cowboys to compel the herd to get up and resume

the march was in vain. The poor creatures, too tired to battle against the drifting sand, allowed it to rise around them, and when at last they themselves seemed to realize that they must make an effort to extricate themselves or they would perish, it was too late, and when morning dawned it found the cattleman ruined, his herd all dead or dying, and a mass of shapeless forms with here and there a protruding head or pair of horns, all that remained to tell of what, the day before, had seemed to be enough to bring him in a small fortune.

Old stage-station at Vallecito

CHAPTER XVII

Water on the Desert



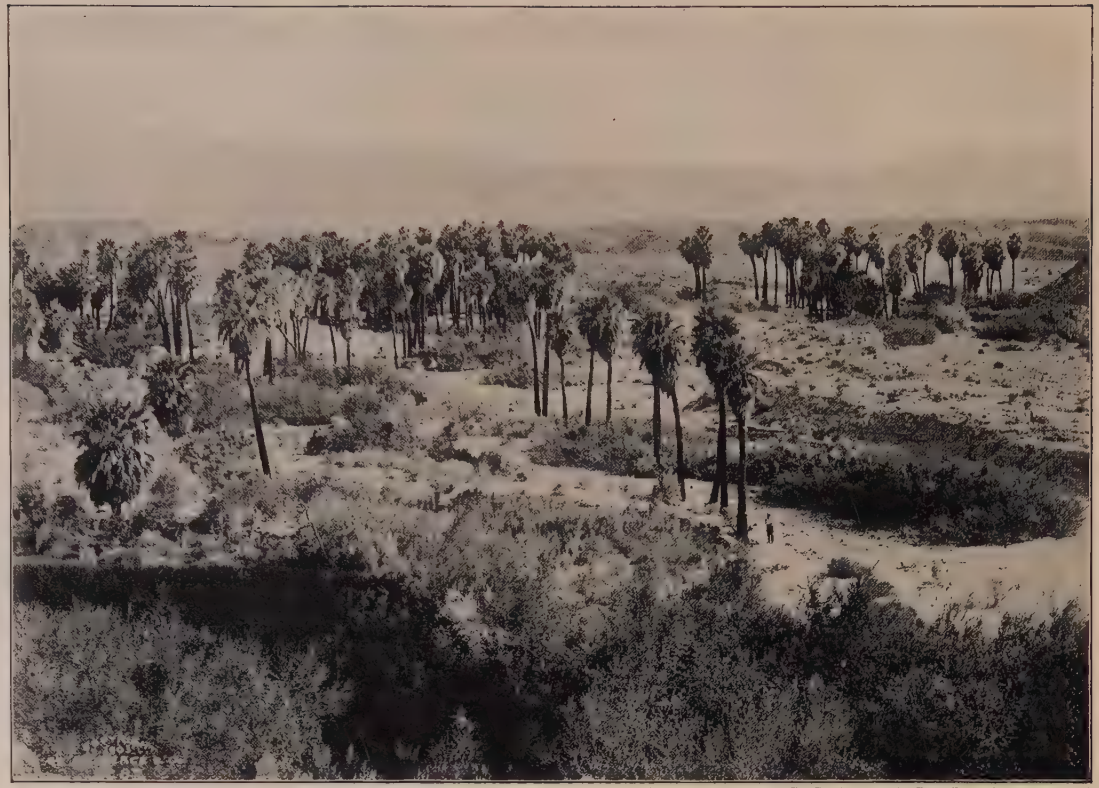
NOTHING is more precious to either the desert denizen or the desert traveler than water. There is no wonder that the desert tribes have symbols that they constantly and persistently force upon the attention of their gods which tell of their love for and need of water. "Give us water, more water," is the motive of these inarticulate prayers. They weave the zigzag of the lightning into their blankets and baskets, paint it upon their leather ornaments and articles of dress and upon their bodies, sprinkle it with different colored sands upon their sacred altars and sing, dance, and pray to the gods controlling the "fire connected with rain"—the lightning—that they may be propitiated to aid in sending the needed water. They weave rainbows in their baskets and sprinkle the sacred meal before the altars of the rainbow gods in rainbow shape in order that the sky may again be arched by this beautiful sign. They cherish the snake as the guardian of the springs and watercourses, for is he not always found where water is? and is not his winding, sinuous course a living type of the winding, sinuous course of the streams? They paint the snake on their girdles, weave him into their blankets, mold and shape him in silver into rings and bracelets for fingers and wrists, carve his effigy out of stone, and represent him by numerous hieroglyphics upon the cliffs and cave-walls of their dwelling-places and camps. They have their snake dances, which are solemn prayers for rain, and their flute dances, which are petitions that the springs may be filled up, and their rain dances and songs, which have the same objects in view.

The Indians of the Colorado Desert not only discovered and

located all the hot and cold springs, but they also did what no other North American tribe has been known to do. John Fiske plainly states that none of them, of whatever grade, ever used either pump or well. The Coahuillas, however, long before the advent of the white man, dug wells on this desert. Indeed they might be differentiated from other tribes by being called "well-diggers," as the whole of the Coachella Valley is dotted over with their wells. Some of these are fully twenty-five to thirty feet deep. The nearer one gets to the Salton Sea, however, the closer is water found

An ancient Indian well

to the surface. The very existence of the Coahuillas upon the desert depended upon their ability as well-diggers. Their name for the wells is *te'ma-ka'-wo-mal-em*, signifying "water-jar in the earth," *temal* meaning earth or ground, and *kawomal*, water-jar. These wells were usually great pits with terraced sides leading down to the narrow hole at the bottom, where the woman could step to the water's edge and there fill her *olla*. In some cases the well was dug as white men would dig it, with an inclined plane sloping to the pool from the upper level. In one of Mr. Eytel's drawings a well will be seen where the



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IN THOUSAND PALM CANYON, COLORADO DESERT

terraces are still quite distinct. Since other water supply has been found, many of these wells have become more or less choked up with sand and earth, though quite a number are still in use away from the mountain streams and the artesian flows.

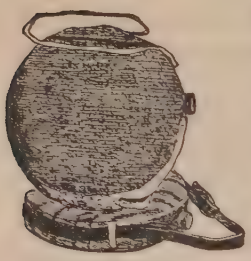
Blake describes (1853) the Indians clustered around the hot spring at Palm Valley, and then tells of the deep well, twelve miles southeast, where his party camped on the following day: "It was at the base of a high sand-drift, and about twenty-five feet deep, but contained only a little water. It was wide at the top, but became smaller towards the bottom, being a funnel-shaped depression. The water was obtained by means of steps cut in the sides of the pit, the clay having hardened by drying so as to become like stone. This excavation appeared to have been made by the *hands* of Indians, for there were no marks of implements, and the clay that had been removed appeared to have been taken out while very moist and plastic. The opening to the well was shaded by several mesquite trees."

Ever since the advent of the white man there has been conflict between him and the Indian for the possession of the springs, water-pockets, and streams on the desert. Outrages innumerable, violence incalculable, hatred immeasurable, murders unnumbered have been the result of this conflict, — all owing to the scarcity of this precious fluid. Nor has war between red and white alone been an evidence of water's preciousness. White men have cursed, maimed, wounded, and slain each other times without count on the deserts of our Southwest because water was scarce. Not a few have located on the only source of supply in a particularly barren, desolate, desert region, and by force have collected large toll of the unfortunate beings whose journeyings led them over this inhospitable road. Men have been found, knife and gun in hand, slain in a desperate conflict for possession of this precious supply.

Early day travelers and prospectors on the desert were entirely dependent either upon the favor of Indians or their own skill to discover water-holes, "seeps," or springs. The history of the tragedies of those days has never been written and never will be, for no man knoweth how many lives were lost in the eager search for wealth prior to and succeeding the great gold

discovery of '49. In later years men have banded together a little more. There has been a kind of freemasonry among prospectors. They have told each other where water was to be found. Occasionally a man would find himself in a region which promised well and he would clean out a good sized "tank," or even dig a well, if the water seemed to be near the surface. But not until recently have the officials of the counties made any endeavor to provide water, even on the roads more often traveled. On the county road going north from Mecca to the Mohave Desert country, twelve miles out is a well which bears the name of Shaver, he being the county commissioner under whose direction it was dug.

At Cottonwood, some miles farther on, is a good spring or seep, which the owners of the Iron Chief Mine have gone to considerable expense to conserve. They have built two stone and cement reservoirs, piped the water into troughs in large feed corrals, and also erected a pumping plant to force the water to their mine some twenty-five to twenty-eight miles away.



Our canteens

Four miles southwest from Cottonwood is Palm Tree Canyon, where "Charley" Anschultz has his mining prospects.[1] Here there is a fair supply of water which makes his work possible. Without the water he would either have to abandon his mining endeavors or "pack" water over the trail from Cottonwood springs.

Knowledge of the few water-holes, springs, and wells on the desert is essential to the prospector, hence it is singular, to say the least, that no more definite effort has been made by the desert county officials to make these locations better known.

As I show in a later chapter on Sign-boards on the Desert, George W. Parsons, of the Mining Committee of the Los Angeles

[1] Since the above was written this well-known desert prospector and miner has come to an untimely end. Two men and a woman stole two horses from Mecca on Sunday night, September 9, one of which belonged to Anschultz. The next morning he followed the thieves, alone, and indications show that he was ambushed and murdered when he came up to them.

Chamber of Commerce, has been agitating a concerted movement to this end for some years. The desert wells should be cleaned out, covered so that animals will not fall in and drown, and buckets and ropes provided to reach the water. Then signs should be erected on all the trails giving explicit instructions how to reach water in every direction. Regular visits should also be made to see that the wells are kept in good order. Riverside leads the state in this regard, and it is to be hoped the good work will continue until the desert wells are as numerous and easily reached as they should be.

But even on the line of the railway, where water can be had every ten to fifteen miles, one should be exceedingly careful about venturing without a full supply.

The reflection of the heat from the sand is so intense that no person, however well used to the desert, should think of going unprovided for more than two or three miles. Men have started off, in perfect derision of kind cautions, to walk along the railway track. The idea that any man could not walk from one station to another on a railway track without water was too preposterous for them to consider. Yet in the years since the railway was completed in 1881 it is safe to say fifty men have thus lost their lives.

The most careless observer can scarcely fail to notice that each train, going east or west, over the desert, has its own water-car. Eastward water-cars are put on at Indio and taken as far as Mammoth Tank, and westward bound the engines fill up their tender and then hook on the water-car at Mammoth, dropping it at Indio. Freight and passenger trains alike are thus compelled to draw their own water supply. To remedy this, if possible, three artesian wells were bored, some years ago, at Mortmere (not the present Mortmere, but the one that is now under the waters of the Salton Sea), and a full flow was secured in all cases, the water pouring out in good volume two feet over the casing. But on testing it, it was found to be unsuitable for the use of the locomotives, some mineral or other substance in it producing foaming in the boilers. Hence the railway company was compelled to go back to its old method of hauling water-cars, which it still continues.

In 1899 a successful well was bored by the Southern Pacific Railway Company at Mecca, from which a good flow of pure soft water was obtained. Then the government appropriated $2,500 for the sinking of an artesian well at Martinez, in order to see if something could not be done to change the abject condition of the Indians. It proved to be a wonderful well, and is still flowing constantly. The flow was so abundant that it and the well at Mecca may be said to have given the present life to the Coachella Valley, for without artesian water nine-tenths of the present white inhabitants would be unable to live there. The settlement of the valley dates from the discovery of this belt of artesian water. Immediately all available land was taken up under the homestead and desert land acts, except that which is on the railway grant.

The modern artesian well

There are now nearly three hundred artesian wells in the Coachella Valley. They range generally from 450 to 550 feet deep, though there are some that range between 330 to 650 feet. The cost of boring is about $1.00 per foot, according to the casing used, a four-inch pipe being the regular size. The well at the experimental date farm, at Mecca, is 482 feet deep and yields 35 miner's inches of water.

Surface wells can be dug anywhere in the Coachella Valley and water found at from 50 to 300 feet. In the upper part of the valley, say near Indio, this surface water is of fair quality, but it becomes more alkaline as one goes farther south.

The water that flows from the artesian wells is about 60° Fahrenheit, and is warm enough to promote the growth of the plants to be irrigated, even though it immediately come in contact with them. Too cold water will often retard plant growth.

This water also is "soft," so that for domestic purposes it is

greatly to be desired. To one used to a "hard" water, where soap does not lather freely, this desert water is peculiarly agreeable. It is good to the "feel," and when, as was our case on the desert, we were often compelled to do our own laundrying, it was a great comfort to have cold water that lathered easily and that seemed to second all our untutored attempts to make our soiled garments and belongings clean.

This artesian water doubtless has its origin from the flow of the near-by mountains. These comprise the entire eastern slope of Mount San Jacinto and the southeastern slope of Mount San Gorgonio. For fully five months, from April to August, the White-water River will discharge three thousand inches of water. For the same period from Tauquitch, Chino, Murray, Andreas, and Palm Canyons a flow of nine thousand inches is a reasonable estimate. All these streams disappear within a mile of their debouch on the desert to add to the inexhaustible artesian supply of the valley below.

In and around the artesian wells at Mecca and in the streams leading from them to the Salton Sea are countless thousands of tiny fish, like minnows. Whether these came from the wells or from the Salton I am unable to say.

In arid regions, where the clouds do not furnish rain in sufficient quantities for crops, water for irrigation is as great a desideratum as land. Given the best soil in the world, without water to make it productive it is valueless. Hence in the desert, where all prosperity depends upon the welfare of the farmer, it is to the interest of all to see that the water supply is conserved, is properly distributed and wisely utilized. While at first sight it may not appear relevant, it is nevertheless true that every desert farmer should be personally interested in the forest region from which he directly obtains his water supply. In the case of those who rely upon the Colorado River this is impossible, but as a general proposition the statement holds good. The water supply of the region is well known to have most intimate connection with the state of the forests. Denudation of forest areas is invariably followed by the conversion of constantly flowing streams into dry washes subject to destructive floods. The forests conserve the moisture and act as feeders to the springs, and when they are

removed, the rain, having nothing to hold it, runs off immediately with great force, carrying with it the humus that helps retain the moisture and renders vegetation possible. Thus in two ways the irrigation farmer is injured: first, his water supply is inconstant and uncertain, either a flood or a drought; and, second, a bare country is soon washed and gullied by its floods which thus carry off a large amount of sediment. This silt and sand fill up reservoirs, canals, and ditches, thus causing considerable annoyance and often great expense.

Of the use of artesian and Colorado River water for purposes of irrigation, a subsequent chapter will deal. There is still, however, a vast amount of water running to waste from the San Bernardino and the San Jacinto ranges, which might, and ultimately will be, impounded and then conveyed in pipes or other conduits for the irrigation of the desert. Thousands of acres of fertile land in both the Imperial and Coachella Valleys, far above the present canal levels and above the flow of artesian water, await the magic touch of the vivifying fluid to produce abundantly.

CHAPTER XVIII

Dr. Widney's Plan for Reflooding the Colorado Desert

IN the year 1873, Dr. J. P. Widney, now of Los Angeles, then an army surgeon who had spent two years in Arizona and had made two careful explorations of the desert, published in the *Overland Monthly* an elaborate and carefully prepared article in which he sought to demonstrate that great climatic changes had occurred in the regions adjacent to the desert owing to the drying up of the inland sea that once covered the area of the desert, and that, if this desert were again flooded, such beneficent climatic results would return again. He claims that simultaneously with the drying up of the great shut off portion of the gulf that made the Salton Basin, a great climatic change occurred in the surrounding territory including Southern California; the change being marked by a decided and rather sudden increase of aridity.

As there is no other apparent cause for this climatic change he raised the important question as to whether these two apparently coincident transformations should not be looked upon as cause and effect. In support of this view he adduced two readily discernible factors as follows: "What would be the logical result of the transformation into dry land of so large a portion of the ancient gulf? An area one hundred eighty miles in length by an average of at least thirty miles in width has ceased to be covered by water, and has become a parched, heated desert. The yearly evaporation in the Bay of Bengal, as shown by the published proceedings of the Bombay Geographical Society,' is more than sixteen feet. This portion of the gulf, which is surrounded by high mountains, reflecting the sun from their bare sides, shut off from the cool winds of the

ocean, its waters shallow and easily heated, must have been a steaming caldron, keeping the air-currents above constantly saturated with moisture. This evaporation, however, estimated at the rate before given, would be enough, if all recondensed and precipitated, to supply twelve inches of rain to 86,400 square miles — more than double the area of the state of Ohio. Again, that evaporation involves the rendering of a vast amount of active heat latent. This would lower the temperature of all the adjacent territory. Fort Yuma, at the south end of the desert, upon the Colorado River, has, for days at a time, a temperature of 120°. When the desert was covered by the sea the heat must have been lower by a number of degrees. This lowering of the temperature alone, apart from any increase of moisture in the air, would add to the rainfall, by increasing the condensation of vapor already brought by the rain-currents from farther south. The augmented dampness of the atmosphere and the consequent fall of temperature would have another effect. Such rain as had fallen over the adjacent country would be less quickly dried up, by giving a moister soil and more numerous springs and streams of water. It is not probable that Western Arizona, the Mohave Desert, and the mountains surrounding the Colorado Desert were ever sufficiently well watered for any general system of agriculture, but it is probable that there was enough moisture to supply forests where none now exist, to feed innumerable streams for irrigation where now the channels are dry except after an occasional storm, and to support an annual growth of grass for grazing where now are barren wastes."

Indian woman carrying a load

The other factor he presents as follows: "Any one who has resided a few years in the Los Angeles and San Bernardino valleys cannot have failed to notice and execrate the baffling west wind that so often breaks up the storm-current from which refreshing rain is hoped. A southeaster sets in, blows for several days, clouds gather loweringly upon the mountains, and the parched

earth waits for the cooling shower. But suddenly the storm-drift checks, the west wind comes rushing in, there is an angry commotion in the upper air, and the clouds, baffled and beaten, are driven back, carrying with them their precious moisture, through the mountain passes to the interior. This especially happens in the evening, the time for the full strength of the daily sea-breeze, and so repeatedly that the plaintive remark is often heard, 'If only our rain-current will continue until the turn of the evening, we shall escape the west wind, and then we are certain of another day's rain.' What is the cause of this interruption? Simply this: back of those mountains is the desert. All day it is heating up with the sun. When afternoon comes, it is probably 40° hotter than the ocean on the west. Then the cold sea air rushes in through every break in the mountain chain, to take the place of this rarified atmosphere, forcing back with it the clouds, whose moisture is quickly dissipated by the scorching breath of the sands. So constant and powerful is this wind-current that the trees in the San Gorgonio Pass are all blown from the perpendicular, and slant toward the east.

"The same warring of winds is seen again in the months of July and August. Los Angeles, San Bernardino, and San Diego Counties are really within the circuit of the Sonora summer rains. Again comes the southeast wind but more gently than in the winter. Now it seems to follow rather up the course of the gulf, and from there passes over westward. Again the clouds gather upon the mountain-tops. Light showers fall, even heavy rains, in the San Bernardino Mountains. Thunder and lightning are frequent. But the disturbing influence of the Colorado Desert again makes itself felt. In winter it was hot. Now it is a fiery furnace. It glows and warms with ever increasing heat; without water, without life. Day knows no respite; night brings no freshness — 120°, even 130° are recorded. The rains have trailed up the gulf. They have refreshed Sonora and Lower California. Arizona has grown green. They have followed the Colorado River far to the north. They have even turned the upper end of the Colorado Desert, and sent occasional floods upon the higher and cooler Mohave Desert and in the mountains about Tehachepi. They have gone to the south of the great fertile plains of Los Angeles and

San Bernardino; they have skirted the western edge of Arizona, back of them; they have doubled around and spent their strength upon the mountains north of them. Why have these rains thus gone all around the only extensive fertile portion of Southern California and yet avoided it as a forbidden land? Because, to reach it, they must cross the Colorado Desert, and its fiery breath is to them the blast of death. Should they cross it, should other rain-currents follow up the coast from the south, the cold wind of the ocean, rushing in to displace the overheated air of the desert, beats them back, and so the land has no rain."

Dr. Widney then proceeds to show that could the desert be refilled with water — converted from dry, hot sand to an inland lake — the very heat which is reflected from the barren mountain-sides around would be a power of good instead of evil. "The constant evaporation would render heat latent which is now active, thus lowering the annual temperature very perceptibly. This lowering of temperature alone, even if unaccompanied by an increase of moisture in the air, would give a greater rainfall by the more perfect condensation which it would cause. But the evaporation from the surface of the lake would materially augment the supply of vapor in the rain-currents, thus acting in a double manner — a decrease of temperature and an increase of moisture for precipitation. These rain-currents would also meet with less difficulty in making their way against the ocean winds — as these winds, caused largely by the heat of the desert, would be less violent — and would therefore with more certainty and regularity deposit their supply of moisture over the plains of Los Angeles, San Bernardino, and San Diego. When it is considered that every additional inch of rain is worth millions of dollars to these southern counties, the value of such a change in quantity and certainty of fall may be appreciated.

"The difference in the summer climate would be especially marked. The flood season of the Colorado River is from April to September. The flood is caused by the melting of the snows in the Rocky Mountains, where the river has its source.

"The water still retains much of its coolness when it reaches the gulf. The lake in the desert would be at its highest, filled with cold snow-water, just in the hottest portion of the year. All the

influences at work to modify the winter rain would now act with double power, and the summer rains would probably become as reliable in the mountains of Southern California as they now are in the mountains of Arizona. Streams which are used for irrigation would have their flow augmented; other streams which now only furnish water in the winter would become permanent during the year. The grazing lands in the mountains and among the foot-hills would furnish a much more abundant and certain pasturage. The hot, dry winds which now come, at times, from the desert, scorching vegetation, would be cool and laden with vapor."

A rustic gateway

In a later article Dr. Widney showed that it was probable that the flow of water from the Colorado River would not fill the whole of the desert basin, but only the low salt-desert northern portion, thus not only not interfering with the reclamation of the fertile alluvial plain sloping from the south (what is now the Imperial Valley) by irrigation, but really assisting by destroying the desiccating winds which sweep across it from the north, heated and parched by the desert sands of the lower basin.

There is no denying the great power of Dr. Widney's deductions and argument, and had the project been carried out before so much of the land below sea-level was occupied by farms and had become the site of cities it would have been, to say the least, a noteworthy experiment well worth trying by an enlightened government. Unfortunately it was not done. Now it is too late. Much of the northern basin is occupied by

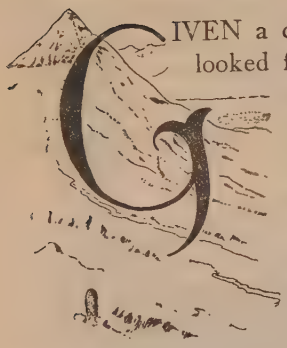
ranches and towns. Mecca, Thermal, Coachella, Indio, and all their well-tilled adjacent territory would have to be abandoned, and unless some method were designed to keep out the water from the lower basin — the Imperial Valley — that whole country, too, would have to be abandoned.

Dr. Widney's plan, however, is one that shows his far-seeing wisdom. It will, in the main, be carried out. But, instead of its being by reflooding the sea, it will be done by converting a much larger portion of its area than he contemplated flooding into a cultivated region. The water will be distributed by irrigating canals, the evaporation will take place from irrigated lands, and the cooling of the atmosphere will be effected by the growing of thousands of square miles of alfalfa, corn, vegetables, and trees of every kind. In a recent letter Dr. Widney says: "The present reflooding of the desert by the unintentional turning of the river I look upon as probably, in the end, a blessing in disguise. If the views I have advanced are correct it certainly will prove such a blessing. With this thought I have not lamented over the failure of the efforts to return the river to its channel again."

The blessing will come, and yet I believe the Colorado will be returned to its old channel. Man with his power and wisdom has set himself the great task. He will accomplish it, and the climatic change will thereby be forwarded, though, instead of a great inland sea, we shall live to gaze upon a vast territory of cultivated lands occupied by a busy, healthy, happy, and prosperous people.

CHAPTER XIX

Palm Springs; An Oasis on the Desert



GIVEN a desert, an oasis is sure to be immediately looked for. Who ever heard of a desert without one? It would be like a sea without islands! The oasis is the eye of the desert; its only means of seeing what it would look like if it were not a desert.

The Colorado Desert has several oases, but they are nearly all made by the labor of man and the vivifying influences of water. One or two small natural oases exist and they will elsewhere be described. But of all oases on the Colorado Desert, Palm Springs is the most beautiful, interesting, and delightful. It is a natural oasis improved by man.

The Palm Springs station

The Indians have always enjoyed Palm Springs. From time immemorial the hot spring has been one of their chief therapeutic agencies in the cure of disease. The dates of Palm Canyon, too, have been a special source of food supply, which they prized very highly, and the close proximity of the spring to the high mountains of San Jacinto where large game abounded, the abundant flow of clear, cold, and pure mountain water from Andreas, Murray, Palm, and West Canyons, and the fact that it is completely sheltered from the north winds and the

fierce blast of the San Gorgonio Pass, all combined to render it a peculiarly desirable location for a village.

The same conditions that attracted the Indians early arrested the attention of the whites, and all through the days of the early emigrations to California its charms and comforts were sung by plainsmen and emigrants, by prospectors and trappers, who had enjoyed its delights after their dangerous and arduous journeys over the less hospitable desert. Now the Southern Pacific railway takes one to within five miles of the valley in which the spring and settlement are located. Riding over the San Gorgonio Pass one often alights at the station to find the pass blast raging in full force. I have elsewhere fully explained the causes of this

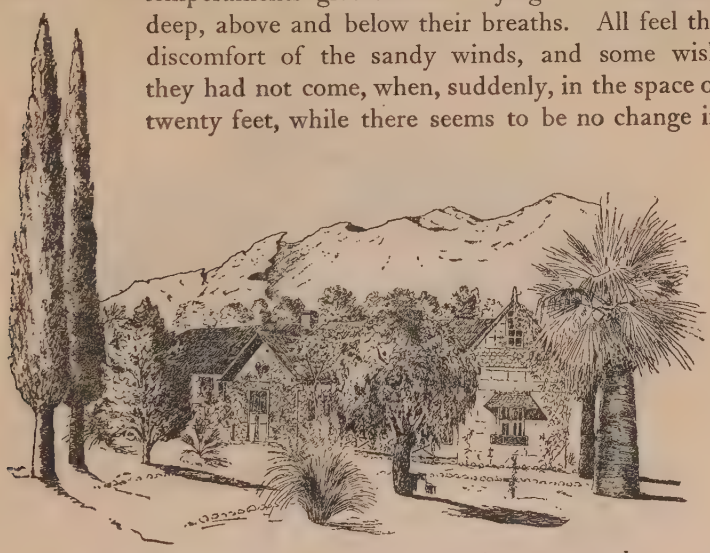
Dr. Murray's hotel at Palm Springs as it appeared twenty years ago

singular and unpleasant desert phenomenon. If, combined with the wind, there is the cold of the snow of the mountains one feels nearly perished as he takes his seat in the buggy or wagon that is to convey him to Palm Springs. This penetrating cold engenders a feeling of derision and strong doubt that within five miles a warm, sheltered spot will be found with so little wind that a lighted candle can be carried around out of doors with certainty that it will not be blown out by any stray gust.

I would not have it supposed, however, that this cold windy condition exists all the time. Sometimes the wind is warm, very occasionally hot, and part of the year it blows but little.

Seated in the conveyance we start on the drive. Crossing the wash of the Whitewater, dry the major part of the year, the wide

expanse of the desert lies to our left and the gigantic mountains and spurs of the San Jacinto range to the right. The wind blows fiercely. The sand particles are borne along in its clutch, and ere we have gone a mile we are covered from hat to shoes with the tiny particles. Women generally wrap themselves up, covering their heads with a shawl. Men of impulsive and irascible temperaments give vent to objurgations loud and deep, above and below their breaths. All feel the discomfort of the sandy winds, and some wish they had not come, when, suddenly, in the space of twenty feet, while there seems to be no change in



Dr. Murray's hotel at Palm Springs as it appears to-day

the conditions, the wind ceases and peace and comfort reign, where hitherto it had been storm and discomfort. We have passed into the shelter of one of the protecting spurs which shuts off the wind of the pass as though by a closed and barred door. Now we may shed overcoats and shawls, for neither wind nor cold will disturb us so long as we remain in this sheltered region.

This is one secret of the great charm and attractiveness of Palm Springs. It is protected from the north winds, and it is seldom the hot, scorching winds of the south pass over its sheltered area. While it is subject all the time to the warm and healthful influences of the desert, the harsher and more enervating conditions never intrude.

As we ride along we begin to experience different sensations in our olfactory nerves. The peculiar dryness and "herbiness" of the desert air give place to the damper feeling of growing vegetation. We can smell alfalfa and hear the lapping of running water in irrigating ditches. Soon we smell the smoke of burning wood, and hear the barking of the dogs of the Indian village. Then, in the dusk, tents of campers-out and the dwellings of the settlement are dimly discerned, our buggy stops, and we alight at the hotel.

Cottage of palm-leaves at Palm Springs

After a delicious sleep, with the sides of our cottage completely opened to the refreshing cool desert air, we look around the village. It is only a small settlement, but how interesting! Twenty years ago Dr. Wellwood Murray and his wife established a place of rest and recuperation here, where men and women tired out and weary with overwork or with a tendency to bronchial or pulmonary troubles could come and recuperate and return to their homes completely restored to health. It is free from fogs, and while sand-storms blow a few miles away with uncontrolled fury, they never overcome the barrier of the San Jacinto spurs before referred to. The elevation above sea-level is about 500 feet, and the annual

rainfall three inches. The average relative humidity is but fifteen per cent. The importance of these tersely stated facts is at once apparent to those conversant with the effect of moisture on the development of disease. When, with the absence of injurious conditions, one remembers the superlative beneficial conditions of antiseptic atmosphere, completely purified in nature's own great laboratory, the desert; the vivifying power of direct sunlight; the balsamic and healing odors of the mountain forests which gently breathe down upon this valley every night in the year; the perfect quiet; the pure water from the near-by moun-

Palm Springs store

tain springs, it is readily apparent what advantages Palm Springs possesses as a natural sanitarium.

From an old picture Mr. Eytel has made a sketch of the hotel as it appeared at that time. Nothing but desert shrubs, sand, rocks, mountain, and climate, with the clear blue sky and serene stars, met the visitor of those days. Now what a change! Palms of several varieties, mesquites, roses, vines, and shrubs of many kinds, oranges, lemons, figs, apricots, and grapes show the marvelous productiveness of the soil, and have converted the scene into one of tropical beauty. Around the main building, ensconced in the shelter of orange, lemon, fig, or almond trees, are picturesque cottages and tents. Some of these are built of palm-leaves tacked upon a wooden frame. Thatch, sides, back, and front are all

of the fronded palm, and the effect is as winsome and attractive as the most exacting could desire.

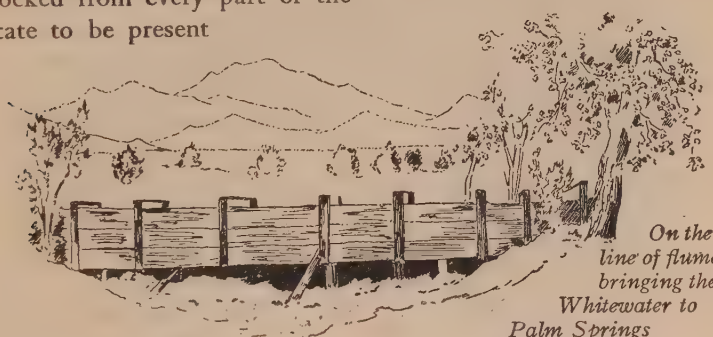
The trees, too, are not scrawny, dejected, struggling members of the arboreal family. They are robust, strong, symmetrical, and vigorous. On their reservation, just across the road, the Indians have a number of fig trees, some of them perfect giants. They bear prolifically, and as the fruit ripens some six weeks to two months before the earliest varieties in and around Los Angeles it brings good prices when shipped to market.

The oranges also are especially attractive on the desert. I have

The McCallum ranch-house, Palm Springs

about thirty orange trees on my home place in Pasadena, but every year, owing to the black scale and a smutty disease that partially covers leaves and branches as if with a thin coating of soot, we are compelled to have the trees "sprayed" with certain chemical compounds. When the spray has done its destructive work and the fall rains come, our trees, for a short time, look fresh, beautiful, clean, and attractive. Then they slowly drift back to their former unclean condition. One can well imagine, therefore, my delight to see trees that all through the year have this fresh, delicious, clean look. There is no scale or disease of any kind afflicting the orange trees at Palm Springs.

Not far away is the Palm Valley store, a typical desert place, where the prospector and traveler, the tent-dweller and the hunter, may alike replenish his stock of canned and other eatables and procure feed for his animals. Close by is the McCallum ranch-house. This is an old-fashioned adobe structure, and was one of the first erected in the valley. A few years before Dr. Murray came to the valley Judge McCallum, formerly of Los Angeles, purchased two thousand acres of land and began to experiment with fruits and vegetables. The results of his experiments, combined with those of Dr. Murray, aroused his enthusiastic determination to make of Palm Springs a great resort. He had all the energy and resource of the old-time California boomer, and people flocked from every part of the state to be present



On the line of flume bringing the Whitewater to Palm Springs

at the auction sales of the land. The time chosen for the sale was auspicious, the weather being perfect, as it generally is during the winter months. Everything went off with great éclat, and sales were many and future prospects for Palm Springs unusually rosy. Though the claims of the desert oasis were strongly presented they were not overdrawn. The place had within itself all the possibilities ascribed to it. Acting upon these assurances a number of people began to improve their places and the desert echoed the activities of the budding town. For a while all seemed to prosper. Then, unfortunately, trouble arose over the water supply. As has already been apprehended by the reader, this was a primary necessity. As well be without soil as water to irrigate with. It had been brought in by means of wooden aque-

ducts and stone-lined, cemented canals from the Whitewater, a distance of eighteen miles.

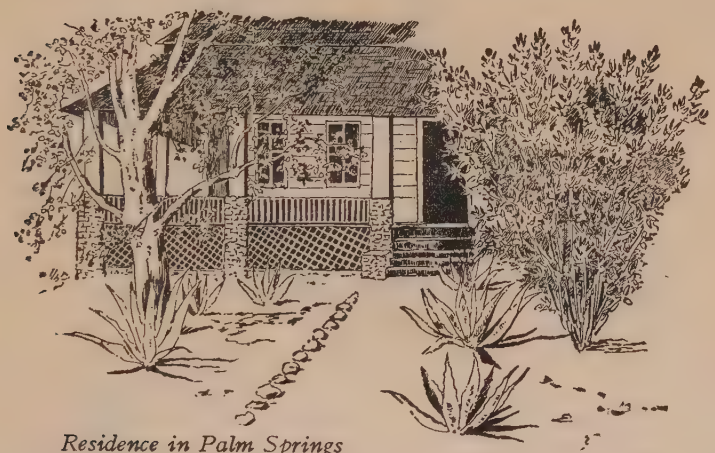
But the floods in the treacherous desert river caused trouble. The channel was changed where the river crossed the desert before reaching the aqueduct and the supply failed. This brought ruin to those who depended upon it, and the water problem to this day has remained an unsolved problem. Until water is assured the growth of Palm Springs will be retarded. A few thousand dollars, ordinary energy, and a fair and honest handling of what water can be secured would remove the main obstacle, and a few short years would see Palm Springs one of the desert marvels of the world.

The stone ditch bringing the Whitewater to Palm Springs

Near to Dr. Murray's beautiful place is an unusually well-built, comfortable, and commodious residence built a few years ago by a San Francisco millionaire who came here as a last hope. The climatic conditions were so beneficial to him that he secured a new lease of life, and in his new-found strength and energy returned to the city of the Golden Gate and married the lady of his choice. The happy couple went to Santa Barbara for their honeymoon. It was unfortunate. He had left the desert too soon, for he took cold, and was too careless in combating it. He returned to the desert relying upon its balmy air and healing influences to drive out the disease, but he had stayed away too long and risked too much, and the end came to his earthly happiness and his life.

Soon thereafter a wealthy Denver merchant, in a state of actual

despair, came to Palm Springs, sent hither by his physician. Though the capitalist had little or no hope, the desert air and healing sunshine soon began to give him a fresh supply of life. He improved rapidly, so rapidly that he decided to go and settle up his Colorado business, return to Palm Springs and devote the remainder of his life to the development of water for the settlement and a few other needed improvements. He went, and his case was but a repetition of that of his predecessor. Trusting too much to what the desert had done so speedily for him, he neglected the precautions he should have taken. He wanted to



Residence in Palm Springs

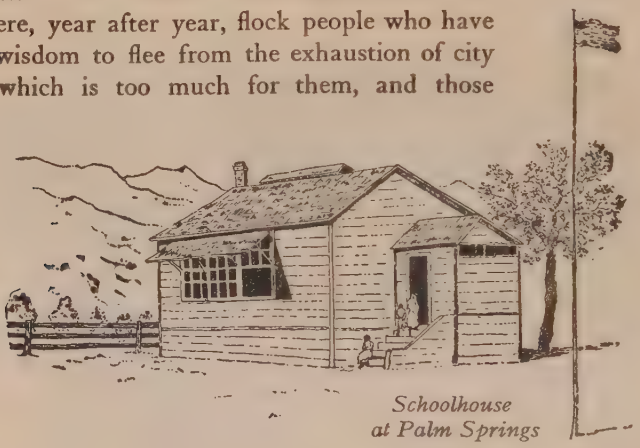
take a last look at his beloved Colorado from the summit of Pike's Peak. In making the ascent he brought on, with great force, his old complaint. A hemorrhage reduced his vitality, and before he could return to the soothing and healing influences of the desert he was "gathered to his fathers."

This over-confidence in one's restoration is one of the things in which the invalid must positively control himself. Recovery is so speedy, there is such a sense of buoyancy and relief, such an inflow of new vigor and life, that one is apt to forget, in the rebound from the depths of despair to the heights of justified new hopes, that it takes time to repair lesions and heal diseased

tissues. The work of healing well begun is a thing to be thankful and joyous about, but it should not lead to the taking of too many risks. Complete health can be assured in thousands of apparently hopeless cases if the invalid will be patient and give himself proper time.

The residence occupied by these two people is now owned by the wife of a San Diego capitalist who finds health for herself and her child in the desert. There is also a schoolhouse and a church in the settlement, both largely the result of Dr. Murray's efforts.

Here, year after year, flock people who have the wisdom to flee from the exhaustion of city life which is too much for them, and those

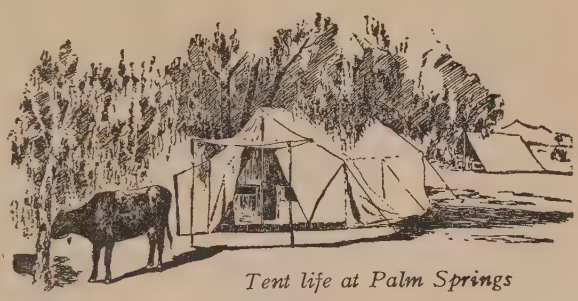


Schoolhouse at Palm Springs

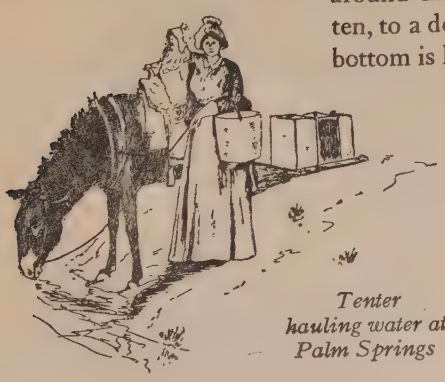
who need to be restored to health. Many are people of moderate means, and these usually, by compulsion, take the surest and best way to regain the vigor they have lost. They live out of doors in tents that are made so as to open and thus allow fullest access to the air, while affording complete seclusion when necessary. In one of the sketches a tent is shown, the occupants of which purchased a cow. The invalid was the husband of a young school-teacher, who came here on the verge of the grave. His devoted wife cared for him with the energy of desperate love. She milked the cow, and day after day hitched their patient burro to a rude sled of her own contrivance, whereon she placed coal-oil cans, and drove down to the ditch, full of pure cold water from the snow-banks of San Jacinto, there to renew

the water supply for the day. I am glad to record that the invalid left Palm Springs perfectly restored to health.

Opposite Dr. Murray's hotel is the remarkable spring from which the settlement gets its name. Here is the Palm Spring, the *agua caliente*, the hot spring, that to Indians and whites alike has been a source of wonder as well as of health for many years. This spring is unparalleled on the Pacific Coast and, as far as I know, in the world. Through a central shaft, varying in size from a small hole to the dimensions of an ordinary well, hot water and sand rise, sometimes spouting high in air like a geyser, but usually merely bubbling over the surface. The water spreads around in a pool about six feet by ten, to a depth of a few inches. The bottom is hard sand until one reaches the shaft, then it is moving quicksand, kept in an almost constant state of ebullition by the upflow of the water. Immediately the bather reaches this quicksand he sinks with a swift motion that makes the heart leap unless he is prepared. In a moment the warm liquid sand closes around the body and it feels as if he were being sucked in and down by the clinging tentacles of some living creature that had the power to hold the body in a most soothing and satisfactory embrace. Then, suddenly, with a convulsive effort, but as gently

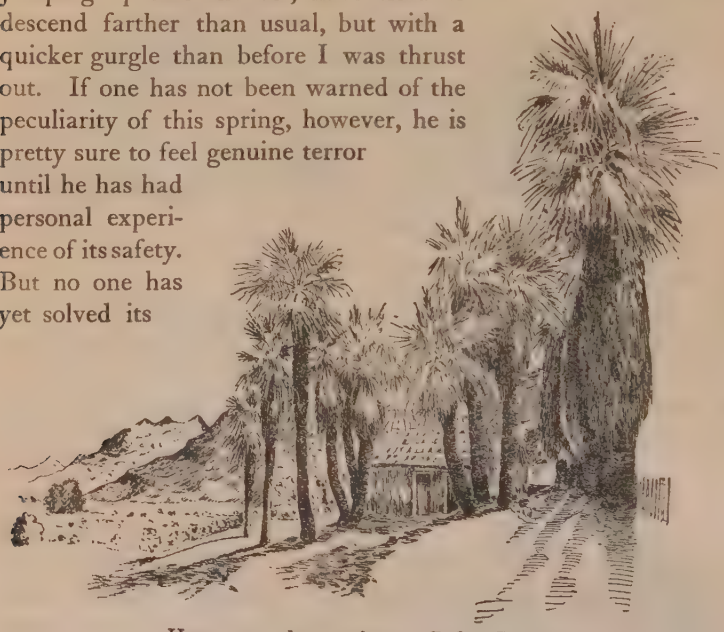


Tent life at Palm Springs



Tenter hauling water at Palm Springs

as if one were being lifted up in his mother's arms, the water of the shaft gives an upward "bubble" upon which the bather is lifted completely out and the pool once more becomes placid. The strange thing is that, exercise one's efforts as he will, the spring ejects the bather ere he can more than get his shoulders into the water. I have stood on a plank by the side of the shaft, and, jumping up into the air, have tried to descend farther than usual, but with a quicker gurgle than before I was thrust out. If one has not been warned of the peculiarity of this spring, however, he is pretty sure to feel genuine terror until he has had personal experience of its safety. But no one has yet solved its mystery. Its depth has not yet been sounded and its existence is unexplained.



House over hot spring at Palm Springs

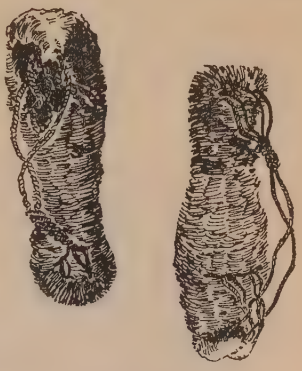
The chemist has analyzed its waters and tells of the various diseases it is capable of curing, but "all that you care to know is that the black sand washes you as beautifully clean as the best rubber in a Hamman bath, and that the effect of the hot water is wonderfully exhilarating. There is no trace of relaxation of the muscles, none of the enervating influence that usually follows a hot bath. Instead, this mysterious water, so full of mineral strength, acts as a powerful tonic to the system, and one comes

Photo. by H. C. Tibbitts, San Francisco, Cal.

PALM SPRINGS, COLORADO DESERT

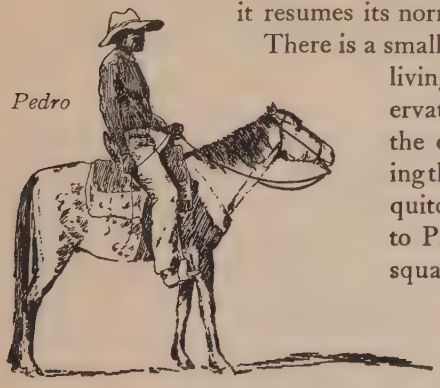
out of the bath feeling as though he had taken several glasses of champagne."

So wrote George Hamlin Fitch some years ago, and many baths in the spring enable me to confirm his statements, save and except as to the several glasses of champagne, of which he is a better judge than I.



Palm-leaf sandals

In the spring of 1904 I visited this spring with a number of friends. I had excited their curiosity to the highest pitch, and, in my bathing-suit, I stood on the plank ready to spring into the shaft. The water and sand bubbled up as usual, hiding any opening, but supposing it was where I had always found it, I sprang and dropped into the water about up to my knees. The laugh that went up was disconcerting, and I sought to find the shaft, but to my amazement it had disappeared. Very occasionally, the Indians tell me, it becomes choked up with sand and for a few hours will present a solid surface, then, with one of its convulsive "gurgles," the shaft is cleared, the sand disappears, and it resumes its normal condition.

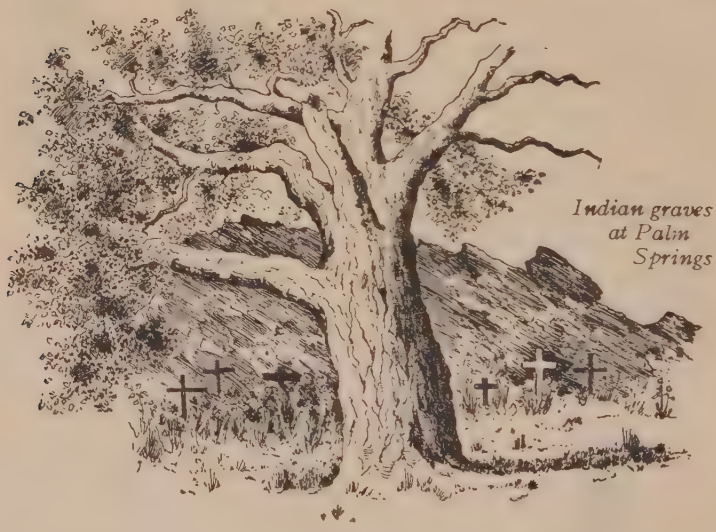


Pedro

There is a small band of Coahuilla Indians living on the Palm Springs reservation. Saturnino is one of the oldest. He aided in building the ditch that brings the Tauquitch or West Canyon water to Palm Springs. Some of the squaws are basket-makers, though most of them engage, with their husbands, in agricultural and horticultural work. Occasionally a woman may be seen, as in the olden days, carrying a heavy load in a blanket suspended from her forehead, or laden down

with palm leaves from which she strips the wrapping splints for the manufacture of her baskets. These palm leaves are also used in the making of sandals or foot-pads, *wak-ut-em*, provided with a loop behind and two tie-strings in front, one passing between the great and second toes, and meeting over the instep. They are still in constant use by the old people.

A well-known character is Pedro, one of the medicine-men and also an expert trailer. As a medicine-man he still has considerable influence with his people, though he does not make the preten-

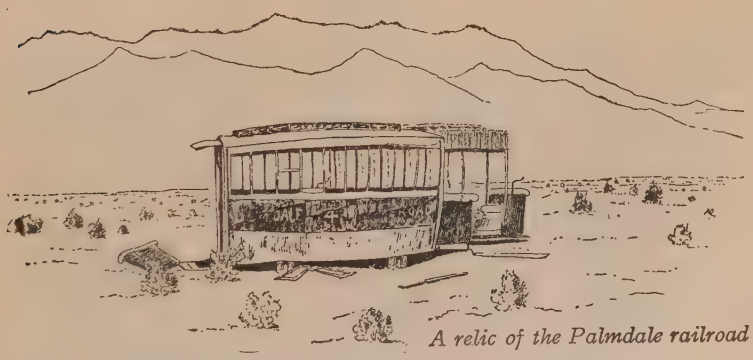


Indian graves at Palm Springs

tious claims that so many of his compeers do in other tribes who live farther away from the white man. As a trailer, however, he is an expert, and many a time he has been called upon by the officials of the county to aid in tracking escaped criminals.

Behind the McCallum ranch is the old graveyard of the Indians. Though no priest ever resided at Palm Springs, the influence of the Church's teachings is manifest in the presence of the crosses over the graves. Cremation and burial were both practised before the coming of the Franciscans to California, but little by little their teachings led to the abandonment of the former, and now burial is universal.

A few miles southwest from Palm Springs, yet not entirely out of the zone of the sheltered valley, is Palmdale. It is a memorial of the boom days. Professor Wheaton of Riverside, who was forced by asthma to seek the dry and curative air of the desert, found himself so much bettered at Palm Springs that he induced a number of Boston people to improve small places. He was also instrumental in organizing the Palmdale company which planted out one hundred and sixty acres in oranges. With a burst of energetic enthusiasm these newcomers determined to have a horse-car railway from Palm Springs station and the lines were laid and cars brought, and for a few brief months regular trips were made each day to and from the station. Then the water complications arose;



A relic of the Palmdale railroad

the trees rapidly suffered for want of a sufficient supply, there seemed to be no immediate or remote prospect of a remedy, and in despair the colony was practically abandoned. So that to-day, if one were accidentally to lose his way on the desert he might come across the rusty rails of the old Palmdale railway, and resting upon it, its wheels almost buried in the ever-shifting sand, find one of the old street-cars, exactly as Mr. Eytel has pictured it.

As I have shown elsewhere, Palm Springs is a natural habitat of a large variety of birds. An abundance of water for them; the sheltered position from the fierce, cold, stormy winds of the mountains and the hot winds of the desert; the rich verdure; the close proximity to the mountains, on the other side of which is a large fertile plain and the placid ocean, — all these things combine

to make it peculiarly alluring to birds. Indeed it has several times been proposed by the expert ornithologists of the state that it be made a special station for the study of desert birds. Professor Joseph Grinnell of Pasadena has published an interesting though brief monograph on "Midwinter Birds at Palm Springs."

In close proximity to Palm Springs are several most interesting canyons. Chino Canyon is to the east and has already been described in the introduction, and the celebrated Palm Canyon and Tauquitch Canyon will be found adequately set forth in the chapter entitled "From Palms to Pines." But there are still two

The deserted village of Rincon

important and impressive canyons that must be visited. These are Andreas and Murray Canyons. About midway between Palm Springs and Palm Canyon a dim wagon-road turns off to the right which leads you to the mouth of Andreas Canyon. Just before entering it, however, a little on one side of the road, the deserted Indian village of Rincon may be seen, in a small, narrow valley. It is close to the foot-hills. Here for many years the Indians had their unpretentious habitations. They brought water down in little ditches from Andreas Canyon and planted figs and grapes and sought in their simple fashion to improve their condi-

tion. Dr. Murray aided them in procuring seeds and they seemed to be progressing, when a wealthy white man of Riverside, with a selfish disregard for their rights, "took up" the water of Andreas Canyon, piped it down to his "Garden of Eden" (sic!) and left the Indians waterless. When I inform my readers that this was done for purely speculative purposes, as practically next to nothing has been done to improve the Garden of Eden, the strong language used to designate the contemptible conduct of some white men toward the Indians will not be deemed too severe. The Indian agent of that day was not inclined to put himself out to defend the rights of his people and they were soon "dried out" and compelled to move elsewhere. Fortunately the welfare of the Indians to-day is in better hands. The present and former Indian commissioners have injected some honor and regard for simple justice into the minds of agents and inspectors, and it is expected that erelong this criminal injustice and brutal theft at Andreas Canyon will be remedied, the Indians again allowed to take water for all their needs, and their village be rehabilitated. When they left it in their desperation and despair the shovel was allowed to remain by the side of the ditch that their labor had dug. The wooden mortar, hollowed out of the log with a stone axe, the Dutch oven, the trees planted and watched over with so much solicitude, as well as the small dwellings were all abandoned. In a sheltered spot hidden by rocks and shrubs we found a stone mortar and three pottery ollas, placed there doubtless by some broken-hearted woman who hoped some day to return for them. But the battle of life has proven too

Hidden ollas, Rincon

hard for her. The utensils were never needed, for the ways of the white man have so roughened the red woman's pathway that she has left it and gone to discover for herself whether the "Sweet By and By" is any better than the "Hideous Now."

The entrance to Andreas Canyon is strikingly rugged and picturesque. The road approaches at such an angle that one can scarcely believe there is any entrance through the great rocky barrier. Massive rocks, great boulders, desert shrubs, and the waving branches of stately palms combine to make a rugged but entrancing picture, and on making a sharp turn we find ourselves really within the canyon. On our right is a large cave, sheltered by flat masses of overhanging rock, in which the Indians used to live. In the floor of

The entrance to Andreas Canyon

the cave, which extends out into the canyon somewhat, are a number of mortars, hewn out of the solid rock, where the aborigines pounded their acorns and dates and mesquite beans and seeds in the preparation of their daily food.

We need to go a very short distance up Andreas Canyon to have its sweet picturesqueness revealed to us. The clear mountain water comes gurgling and dashing down in fairly large volume, and alders, cottonwoods, and sycamores with willows and a large variety of flowering plants and shrubs vie with the palm in claiming our interest and attention. The canyon received its name from an old Indian who much belied his simple and harmless appearance. In his contact with the white man, aiding him in planting fig trees, oranges, vines, etc., he had learned to love the seductive and strong liquors of his employers. He was a man of considerable energy,

and upon a fertile "bench" about a half-mile up the canyon he built a small adobe house, planted a fig orchard and a vineyard. In some way he learned the art of distilling, and when his grapes began to bear he made his own rude contrivance and began to distil brandy for home consumption. For several years he kept this up, supplying his people with liquor and causing considerable annoyance and mystification to the white residents of Palm Valley by their occasional intoxication. Whence did the Indians secure the liquor? All protested they were innocent of supplying them, and still the bottle circulated and the drunkenness continued. At length Dr. Murray determined to make a little quiet investigation on his own account, and going up to visit Andreas surprised him in the very act. With kind firmness the doctor explained the law to Andreas, and showed the great injury he had been doing his own people by fostering in them the habit of drinking distilled liquors, and then with a few quick blows demolished the still and spilled the liquor. The penitent Indian made no protest, and moonshining in Andreas Canyon thus came to an abrupt end. The old chief (for he was chief of the small band who lived near) soon afterward died, and I believe this is the first time the story of his moral delinquency has been told.

Hidden mortar at the deserted village of Rincon

We now begin the ascent of the canyon. It winds and twists about like a snake, winding its tortuous length deeper and deeper into the heart of the range. It is steep and in places quite narrow, and the cold stream and dense brush make it hard to climb, for one must cross the stream again and again and also force his way through the brush.

The first palm we see is one that on account of its solitariness has been called the Lone Palm. It rises majestically from the rocks, and we see it from below through a cleft in the canyon's side

so that it fairly towers into the abyss of the sky. A mass of rock or shrubs gives the illusion that a man is standing in attentive stillness looking over the vast expanse of rock and desert visible from this point. He seems dominated by the vastness, the mystery, the terror of it all, while the palm, waving to and fro as if in hovering agitation, and speaking in whispers of rustling sibilation, seems to be warning him to beware of wandering from her protecting shelter.

All the way up, at irregular intervals, one comes upon the palms, sometimes in groups, and occasionally solitary and alone. Most of these are untouched by fire, consequently the old leaves have fallen over and formed a protecting covering for the trunk.

Where Chief Andreas lived in Andreas Canyon

These are generally spoken of as "well-dressed" palms, and in the various sketches the reader will be able to discern the difference between a "fired" and a "well-dressed" palm.

Our objective point is the falls of Andreas Canyon, which are about three miles from the mouth, but three miles of arduous walking, over and around boulders, forcing a way through the brush, and fording the stream again and again seems to take a tremendous amount of exhaustive energy. The canyon still winds and twists in monotonous uncertainty, and once or twice, in desperation, we leave the bed of the stream and cross the divides or ridges in hopes of finding the long-looked-for falls. If we could divest ourselves of all hurry and impatience we should revel in the picturesque beauty combined with the rugged grandeur of the scene, for there are few short canyons in California — the wonderful state of canyons and gorges — that can rival Andreas. At length, to our delight,

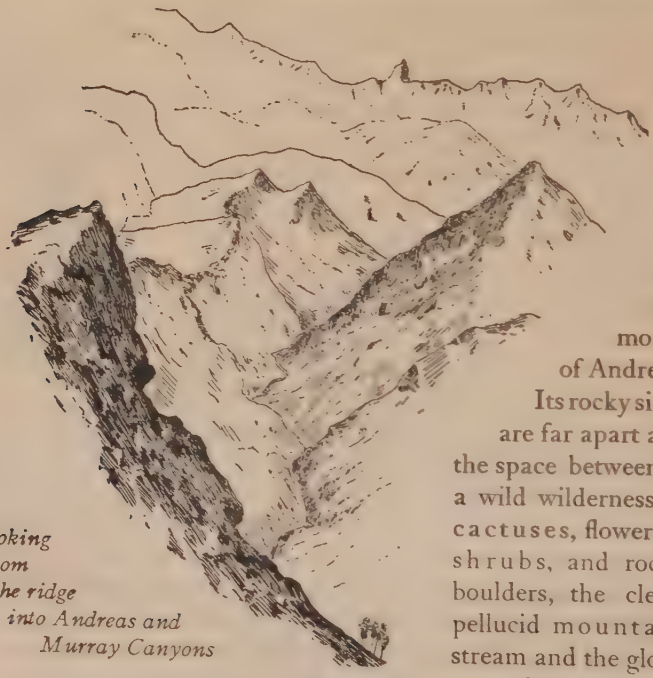
on making a turn, the falls are before us. Crowned with a beautiful grove of palms and lesser foliage that seem to stand near the very edge of the fall, giving a delicious sense of color to the reddish gray granite walls, the water comes gliding down a steep declivity at about sixty degrees to the bed of the canyon below. Two huge boulders arrest its flow, around which the water dashes itself into a fury of white foam and spray. The fall divides into two and more parts except when the water is in full flow, but no matter when seen it is enchantingly lovely. The mocking-birds, larks, humming-birds, and canyon wrens all come to enjoy the scene, for it is quiet and lonely enough for the shyest and most timid of creatures. It is seldom visited, perhaps not five persons a year going to see it. Making a sharp turn at its foot, the canyon is deceptive enough to lead one away from the fall unless his ears are attuned to the difference in the rippling of the cascade and the ordinary flow of the stream.

Waterfall in Andreas Canyon

Palms, Andreas Canyon

Ascending to one of the ridges of the mountain we have a glorious and extensive view of towering peaks behind with two canyons before us. Immediately at our feet, winding and curving away into the secret recesses of the range, is Andreas Canyon, while to the left, smaller and less clearly defined, is Murray Canyon, so named after the venerable genius of Palm Springs, my good friend Dr. Wellwood Murray. The sight allures us. We have walked up Murray Canyon, but now we want the experience of crossing over from Andreas and walking down it. The distance apart is about two miles, which we make

with some difficulty, the slopes being steep, rocky, and deeply gullied. At length we are in Murray Canyon, and save for some variations in width we might well imagine ourselves in Andreas or Palm Canyon. On reaching its mouth, however, we look back, and find it far more imposing than the mouth of Andreas. Its rocky sides are far apart and the space between is a wild wilderness of cactuses, flowering shrubs, and rocky boulders, the clear, pellucid mountain stream and the glorious palms alone giving the picturesque life we so much love to see. Beyond and higher up are the steep walls of the volcanic upthrust that makes San Jacinto so noted, while on the higher peaks stately pines stand in sight of perpetual snow from which they are constantly watered. As we turn, the vast stretch of the desert hemmed in by the San Bernardino Mountains is laid out before us, its monotonous plain — almost colorless at this distance — being the very antithesis of the canyons in which our day has been spent.



Looking from the ridge into Andreas and Murray Canyons

CHAPTER XX

Prospecting and Mining on the Desert

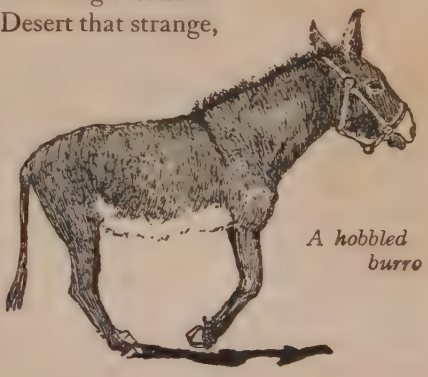
FROM time immemorial men have sought wealth in the most unlikely and unpromising places. There is no desert, however terrible in its natural conditions, that man will not dare if thereby he may gain gold, or thinks he may. The lure of the mine is more potent than the lure of fame, of beauty, of power. The desert has proven itself a natural home of the precious metals. The great Comstock lode that made Virginia City, Gold Hill, and near-by camps and gave colossal fortunes to the Floods, Fairs, O'Briens, Sharons, Millses, Mackeys, Joneses, Stewarts, and others was in the heart of the Nevada Desert. So were Hamilton, Eureka, Austin, Tuscarora, Bodie, and Esmeralda, and later, Randsburg, Tonapah, Manhattan, Goldfield, and Bull Frog. Millions, nay billions, have been taken from these mines, while in Arizona a score of mines could be mentioned from which vast wealth has been taken.

Gold, silver, and copper have already been found in large quantities within the borders of the Colorado Desert. The Hedges Mine, reached from Ogilby station, on the Southern Pacific, has yielded not less than five millions to its owners. In 1897, when it was at its best, it had about four hundred men on its pay-roll, and its forty-stamp mill was kept thundering away day and night. At one clean-up $50,000 was taken. So successful was it that its owners increased the mill from forty to one hundred stamps, and made great preparations for further development. Then things went wrong and a receiver was appointed, and for some seven years the mine has been in his hands. Not far away is the "American Girl" Mine, owned by Ex-Governor H. H. Markham and his confrères. United States Senators Stephen Dorsey and

J. P. Jones have also extensive mining interests at Picacho on the Colorado River.

It is not surprising then that men have constantly been found who were willing to undergo any peril, dare any danger, face any hardship with the possibility ever before them of "striking it rich" and by a lucky find leaping at once into the possession of a fortune.

To possess gold most men think is to possess that which purchases all else needful. This erroneous and pitiable view is one great secret of the prospector's and miner's daring in braving all the horrors, known and unknown, of the desert. Mystery, too, also has great fascination for some men. And it was natural that from the early days of the Anglo-Saxon's experiences on the Colorado Desert that strange, wild, fantastic stories should float down to later comers' ears of fabulously rich mines known to the Indians which they would not discover to the white man, or of mines accidentally discovered by weary travelers at a time they could reap no advantage from them, and which Fate afterwards prevented them from refinding. Such a lost mine is the famous Pegleg Smith Mine, the story of which can serve as a type for a score or more of lost mine stories that are current in the mining states of the West.



A hobbled burro

In a recent number of the *Los Angeles Herald* the story is given as follows. The story is an old one on the desert and is often told by the camp-fire, in the miner's cabin, on the teamster's wagon, or when a couple or more prospectors are tramping through the hot sands after their pack-burros. And it is never told twice alike. I have heard it a score of times, and each time different, so while this written story is still another version it is just as good as any of the others, and I give it as it is. Perhaps I ought to say, in justice to my readers and myself, that I have no faith

Photo. by C. C. Pierce & Co., Los Angeles, Cal.

ON THE EDGE OF A PLAYA, COLORADO DESERT

in the story, that in many details of geography, etc., it is altogether inaccurate, and that its "positive facts" are utter nonsense.

"WHERE IS PEGLEG SMITH'S LOST MINE?

"This is the puzzling question which has caused many a fortune hunter to search the desert. Somewhere near three buttes that rise from the burning sands the gold lies easy of access. Wealth waits for the man who can find the spot where seventy years ago a party of weary and thirsty trappers camped over night.

"The story of the lost mine has been told many times, but it has remained for one who is interested in the older West to sift the facts, and this is the first authentic story ever pieced together:

"In the year 1836 a man named Smith, and known as 'Pegleg' Smith because he had lost one of his natural legs and wore a wooden one in its stead, with a party of trappers came from St. Louis to the head of the Colorado River. They followed down that stream to the mouth of the Gila River and then struck off across the desert. From Yuma their course was in a southwesterly direction, across a wide stretch of desert, utterly devoid of vegetation, and with no sign of water or life of any kind. They traveled for three days toward some low hills, but as they pressed on they appeared to recede and be always about the same distance from them. At nightfall on the fourth day, however, they made their camp at the very base of the southernmost of the hills.

"In the dim, fading light they could faintly discern the tops of three small buttes to the northward, toward which a deep canyon led. They were nearly out of water, so one of their number was sent to explore the canyon to see if by any chance a spring of water was there. Before long he had climbed to the top of one of the buttes, but had found not a drop of moisture. While at the top of the hill, however, he discovered many loose pieces of black metal, with here and there pieces of some yellow metal showing on the surface of them. He gathered several of the pieces, having the impression that the yellow metal was copper in its native state.

"The trappers camped at the base of the hill that night, and in the morning, by the clear light, they descried a high mountain to the northwest. Their supply of water was almost gone, and

they felt that their only hope was in reaching this high mountain before what remained of the water had been entirely consumed and they perished from thirst on the burning sands of the desert. The man who had picked up the pieces of black metal on the hill-top gave no thought to them, and the one thought and hope in the minds of all of them was to reach the mountainside and find water.

"That night they came to the mountain, which all day had seemed just a short way off, and found a spring of cool, clear water. They were saved, and they thought of little else. The mountain was named 'Smith Mountain,' in honor of Pegleg, who was the first to discover it, and it bears that name to-day.

"At Temecula, where the trappers first stopped, they were told that the pieces of black metal found on the three buttes were gold, but the proof was not conclusive until they reached San Bernardino and submitted their find to an expert. Even then they did not realize the immensity of their discovery. It must be remembered that this was before 'the days of old, the days of gold, the days of '49.'

The trusty pack saddle

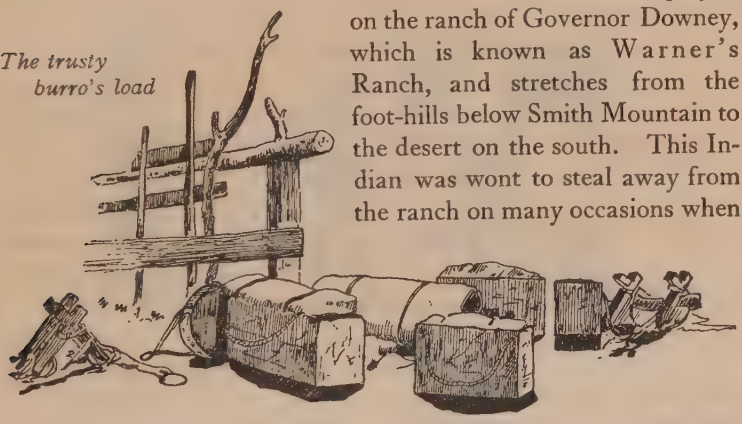
"After the discovery of gold in California and the rush of adventurers from all over the world to the new Eldorado, Smith began to consider. Eventually he became imbued with the idea that he had made a great discovery, and he went to San Francisco where he organized an expedition to seek for the three buttes in Southern California where fabulous wealth was hidden. Fully equipped for a long stay on the desert the expedition left Los Angeles and started in a southeasterly direction for Smith Mountain, where the last water was to be had, but before reaching the springs some Indians who had been brought along to pack the supplies decamped quietly in the night-time with all the provisions and most of the camp equipment, and the expedition was forced to turn back.

"Pegleg Smith, disheartened by the catastrophe, left his followers in San Bernardino, and nothing was ever heard of him again, so

far as history tells. Whether he again attempted to locate the three hills of gold and lost his life on the burning sands, or whether he abandoned the quest and left the country for good, is not known.

"From this time on the story of Pegleg and his discovery began to spread and to assume fantastic forms. Every one who related it told it differently. However, there were those who knew and appreciated the real facts regarding the find, and who never gave up the idea of some day making a journey across the desert in search of the gold that they knew must be there.

"The next authentic piece of history concerning the Pegleg Mine has to do with an Indian employed on the ranch of Governor Downey, which is known as Warner's Ranch, and stretches from the foot-hills below Smith Mountain to the desert on the south. This Indian was wont to steal away from the ranch on many occasions when



The trusty burro's load

he could be fully equipped for a long journey and sometimes upon his return he would display a quantity of gold. It was in the form of black metal, generously sprinkled with free gold, and readily passed for currency at the country stores.

"The Indian was never very particular whether he got the full value of his nuggets or not. He often remarked that he knew where there was plenty more. It was known that he used to enter the desert by way of San Felipe Canyon, which would take him in the very direction of the three low buttes described by Pegleg Smith and his comrades after their first trip over this region, when the discovery was made.

"All these circumstances eventually came to the ears of Gov-

ernor Downey, and he went to the ranch for the purpose of interviewing the Indian, but before he reached there the Indian had gone away to Anaheim and there he was killed in a quarrel over a game of cards. Governor Downey closely questioned the squaw of the Indian and succeeded in getting her to describe as best she could the route taken by her brave on his mysterious journeys to the desert. She said that the Indian got his last supply of water at the foot of Smith Mountain at the identical spring where Pegleg and his comrades found water after leaving the three buttes on the morning after their discovery. She said that he always left Smith Mountain at daybreak and traveled toward

Prospector on the march

the sun and at about three o'clock in the afternoon he would come to the place where 'mucho, mucho gold' was to be had.

"Since that time it is hard to separate the reliable stories of Pegleg's discoveries from the unauthenticated ones and the purely imaginative ones. In 1860 a man named McGuire organized a party of six in San Francisco to go to the Pegleg mine. He claimed to have been there, and showed a number of very valuable gold nuggets to substantiate his assertions. He had certificates of deposit on a San Francisco bank showing that he had plenty of money, and said that he had obtained them by depositing nuggets like those he carried. The six adventurers went through San Felipe Canyon on to the desert, and that was the last ever seen of them. Their bleached bones were found many

months afterward. The bones clearly told the story of the fate of that expedition.

"Fifteen years after this a prospector, in making his way from Arizona to California, wandered far from his way, and became lost on the desert. After he had traveled about for two days he saw, away off in the distance, some low-lying hills, and made his way to the foot of them. In search of water to quench his terrible thirst, he entered a little canyon, and made his way through it to the very top of one of the little buttes. Here he found a number of black nuggets, and believed that they were gold, but water was more precious to him than gold at that time, and he descended to the desert again and finally crawled to the foot of Smith Mountain, where he, too, found the little spring of life-giving water.

"As soon as he was able to travel, this man came to Los Angeles to organize a company to go with him back to the desert; but the hardships he had undergone had been too much for him, and he fell ill. When he learned that he was going to die he confided to Dr. De Courcey, his physician, the particulars of his discovery, and placed in his hands two thousand dollars' worth of gold nuggets, which were those he had picked up during the few months he stayed on the top of the little butte.

"After the death of the miner, Dr. De Courcey spent some time on the desert attempting to locate the vast treasure, but he did not succeed, and finally he, too, died.

"At Flowing Wells, on the edge of the Colorado Desert, the Southern Pacific road has a station, and the agent of the road here some time ago reported that an Indian squaw came to his place one day and showed a quantity of gold nuggets. She guarded them jealously, knowing well their value, but would not talk freely nor tell where she found them, but would point to the direction of Smith Mountain, in line with which would be the three low hills mentioned by Pegleg Smith. This reticence on the part of Indians on this coast is general among them, for the story is that they were told by the Jesuit priests, at the time the Mexican government expelled them from this country,[1] that the Great

[1] This is on a par with a score of statements in this veracious (!) narrative. There never were any Jesuit priests in Upper California, and those who were in Lower California were expelled by the Spanish king, Carlos III, long before there was any Mexican government.—Author's Note.

Spirit would punish them if they ever told or showed a white man where there was gold or silver located.

"Only three months ago a man came across from the Banning side of the desert to a point about twelve miles above Yuma, and stopped at a mill near the river to obtain water and rest. He told the engineer at the mill that he saw many very queer things on his trip, and took from his pocket a handful of black nuggets which he said he thought might be lead by the weight, but concluded they were iron pyrites and laid them down. After he went away the mill man picked up one of the nuggets and with a file removed the coating. Then he discovered it gold. He started in pursuit of the man, overtook him and learned from him that he picked up the nuggets in a gulch where the wind and sand had driven him for shelter, and where he remained all night. He said that there were cartloads of that stuff there. The black coating over the gold obscured from him the value of his find as it has from many others both on the desert and in the Klondike country.

The pack-burro fording a stream

"The nuggets which this man picked up were just like those which Pegleg Smith's comrades found, just like those the Indian brought to Warner's Ranch, and just like those which McGuire brought to San Francisco.

"A wealthy citizen of Riverside named Thomas Cover spent many years in running down clues concerning the location of this great store of wealth, which he was thoroughly convinced existed somewhere on the desert, and finally lost his life in a search for the treasure. He made many trips across the sand wastes and one proved to be his last. He never returned to civilization.

"There are countless stories about the Pegleg Mine which might be related, and not a few of them seem to have the semblance of truth about them, but those which have been related in the foregoing are known positively to be based upon the truth.[1]

"People still are living in San Bernardino who knew and have seen Pegleg Smith and the nuggets of almost pure gold which he brought from the desert. At Warner's Ranch there are to-day people who knew the Indian, and who saw his gold. The records of the San Francisco bank show that McGuire deposited gold nuggets there worth many thousands of dollars. In fact, the authentic history shows that McGuire was the only one who fully realized the magnitude of the find at the time of being on the ground, and the only one who profited largely from it.

"Numerous stories have been told from time to time, during the years which have intervened since Pegleg Smith's wonderful discovery, of Indians and white men who have displayed nuggets of the same kind as those found by Pegleg Smith's comrades, and in every instance they have told of their travels across the desert, of the spring at the base of Smith's Mountain, and of the three buttes rising up out of the desert between Yuma and San Bernardino. Somewhere in this mysterious region are the three hills of gold, told of in all of these tales of the desert. Somewhere, within the grasp of some one who has the hardihood and the perseverance to find it, lies the vast treasure that Pegleg Smith came so near calling his own. The day will come, and the chance is that it is not so very far distant, when the news will be given to the world that Pegleg Smith's bonanza has been found, and somebody will be the richer by many millions.

"There is this to be said of the region in which the stories of the Pegleg Mine discoveries all tend to locate the treasure store: it is a mineral country, every inch of it. Enough is known about the awful desert which stretches from the Colorado River nearly to the sea forever to eliminate the idea that no gold exists there. It is there, and it only needs to be found.[2]

[1] If they are *based* upon the truth they slope very considerably from the perpendicular. — Author's Note.

[2] Most of this mineral exists only in the fertile imagination of this newspaper writer. — Author's Note.

"All of the country between the Colorado and the sea is heavily mineralized, and somewhere in between is the great deposit or ledge, bearing gold in such quantities that the brain of man fairly reels at the thought of such great wealth. It has always been and always will be that such vast treasure stores are hidden away from man in most inaccessible places, and he who discovers the hiding-place must be intrepid and brave even to foolhardiness. So it was in the frozen north, where man faced every peril of land and sea to find the gold. So it is on the desert, where the bones of many a brave man are now bleaching in the glare of the fierce sun.

Pete McGuire

"There is abundant evidence to prove that the Pegleg Mine exists. So much has been written and told of the Pegleg Mine and so widely divergent have been the accounts of its discoveries that there has grown up an impression that it may be all a myth. Such an impression, however, is not borne out by the facts regarding the wonderful discovery, which are as much a matter of true history as those in regard to Washington crossing the Delaware. Grizzled old grub-stake prospectors, with lurid imaginations stimulated with copious draughts of desert whisky and 'Old Tom' tobacco, have poured so many wild stories about the Pegleg Mine into the ears of sallow-complexioned tenderfeet that it is no wonder the whole story has come to be looked upon as a long stretch of some overwrought imagination."

It is seldom that an old prospector or miner runs off in search of one of these mythical (or real) lost mines. It is generally the raw hands that are allured by the prospect of such "easy" gold. Two such recently came to the little desert town of Mecca. They bought a burro and provisions to last two healthy men two or three days. When remonstrated with about starting out on

the desert so poorly equipped, one of them seriously replied that while he was a stranger to the desert, his companion had ridden over it twice (on the train) and had thus become "acclimated." Could human folly transcend this? Yet these two men took their lives in their hands and went out on their search. Fortunately no storm or great heat arose or they certainly would have added their names to the long roll that these "lost mines" have charged against them. They were gone two days, and when they returned they acknowledged they had been on a search for the long-lost "Pegleg Smith Mine." "But," said one of them, "we've had enough. No more searching for mines; at least, none for me!"

There have been and are, however, successful mines on the desert and these are a justification for the hope that others will be discovered. "Where gold is found in one locality, it may be found in another," and "One man's luck may lead to another man's," are proverbs that the prospector constantly keeps before him.

The Colorado Desert has always had an attraction for the prospector from the earliest days of American occupancy — aye, and long before. Its very desolation seemed to be an allurement. The prospector argues that surely a place which is obviously so cursed that nothing will grow upon it must have been created by the Lord of all things for some purpose, and the only purpose it could possibly have was to carry mineral hidden somewhere below its forbidding surface. Though traversed by hostile Indians, the prospector braved its terrors and went with his patient and sturdy mule or burro determined to wrest from it all its golden secrets. What a history of woe and sorrow, of lonely anguish, of horrible death under torture and fear, the history of the prospectors of the Colorado Desert would be if one could ever gather its particulars! But it never will be written, never can be written, as no eye but the All-seeing One, with the silent and pitiless stars, ever saw the horrors perpetrated upon the adventurous white men by their crafty and bitter foes.

Poor prospectors for the pelf of the earth, if sufferings and woes on earth count for anything, in the future your lot will be made easy. No ordinary city-bred person can more than faintly

conceive what such a life means. Where shall the prospector go? He must first of all decide that important question. This decided, he goes to the nearest outfitting point. All love for his fellows he must stifle. If he has wife and family, kindred or friends, he must either say them a long "good-by!" or leave them in doubt as to his whereabouts. He purchases a burro. Then he "outfits." Flour, bacon, coffee, sugar, beans, dried fruit, baking powder are the staples. Weight must be considered. Luxuries are out of the question, and what people ordinarily consider necessities must be "pared down" to the smallest weight and bulk. Frying pan, coffee-pot, water canteen, pick and gold pan, with one or two blankets complete all his

Resting after the day's work

burro can carry. One of the blankets goes under the pack-saddle and the pack is carefully fastened on. There must be equal load on either side and it must be so placed that there will be no rubbing to lame the back of the animal, upon whose strength and willingness so much depends. With canvas covering over the pack the diamond hitch is thrown — the despair of the tenderfoot — and with frying pan, coffee-pot, and gold pan either tied on the top of the pack or swung loosely in a gunny-sack affixed to the rope, the sturdy adventurer turns his back upon civilization, upon luxury, upon association with his fellows, upon books, newspapers, and a knowledge of current events, and goes to live a life of solitude, and with death always before him. His senses must ever be alert, for he must keep near to water. He must go where his burro can find some

slight picking, for, though a prospector's burro can live where a goat would starve to death, he must have some wherewithal for his stomach's coats to grind upon, or the prospector is left alone in the desert to face the horrors of getting back to civilization with incredible hardship, or to wander about in that gray sand with the pitiless sun shining into his brains and robbing them of life and knowledge so that he wanders around and around aimlessly, in a fateful circle, until the hideous vultures watch for his end.

He knows all this, but he grimly clenches his teeth, and walks over the soft and burning sands into the hard and burning canyons, and over the rocky and burning mountains. Wherever he sees the slightest indication of mineral he picks and chips, and examines with his little microscope, or tests with the few chemicals he has in his pockets. When night comes he strips the pack from his jaded and faithful burro's back, hobbles him and turns him loose, then opens up his stores. His gold pan must serve him as a bread pan, or he must mix up his dough — as I have often done — in the flour at the top of his flour sack. A few dried cactus plants, or arrow-weeds, or greasewood, or sage-brush afford him a fire, and there he tosses his flapjacks, using the grease from the bacon he has fried to keep them from sticking. Then at it he goes. He has worked hard since early morning — long before sun-up — and it wasn't worth while stopping for lunch, so he is hungry, and flapjacks and bacon and bacon grease, with milkless coffee, are good, and if he wants dessert he just adds a little sugar to the piece of flapjack that is left over and eats it with a relish. Once in a while, perhaps on Sundays, — though he is never quite sure which is Sunday, after he has been a few days from town, — he stops long enough to cook a mess of dried fruit, using the coffee-pot as a stewpan, or he puts it on at night, carefully propped up on three stones over the fire and with plenty of water to it, so that it will not all cook away, and lets it simmer all night. Then with a confidence as simple and serene and unknowing as that of a newly born babe he spreads out his blankets on the softest rock he can find, takes a chunk of limestone or sand or lava for his pillow, covering it with his soft felt hat, and with or without

a prayer — most likely without — stretches out and for a while dreams wide awake, gazing up at those same stars that shone on the patriarchs of old as they wandered to and fro in the deserts of Asia Minor. And then soft, gentle, dreamless sleep, the sleep of the healthfully weary, falls upon him. Heat nor cold troubles him very much. It is generally cool at night and his constant outdoor life renders him impervious to all ordinary variations of temperature.

But now and then a sand-storm comes, and then he must look out. The winds blow with the force of a hurricane, but the air is hot, hot, hotter, hottest, and the sand seems to have been scrubbed and rubbed, one particle against another, until it is glowing all through with heat. If it is coarse sand it strikes him with force enough to make pits in his cheek as if he had had the smallpox. If it is fine he must lie down and cover his head with a blanket, and put a wet rag over his nose and mouth, or he will suffocate.

Though it is desert there are times when the flood-gates of heaven are opened and a new deluge strikes this old earth, with no other man to wash away than our lonely prospector. If he is camped in the recesses of a canyon he must instanter, regardless of sheets of descending water, climb the steep hillsides to a place of safety, daring the perilous precipices and the lightning, which bores zigzag holes of piercing light through the terrible darkness of the night. I have sat out several such storms, when old pioneers wrapped their heads up in their blankets and confessed they were afraid — frightfully scared — scared all through to their very boots. The lightnings were not few and far between, but perfect hemispheres of jagged darts of brilliant violet hue and an intensity that led one to feel it was a special display arranged for the delectation of the powers above.

Yet, though I have been speaking of water coming down in floods, a few hours after such a storm one may almost perish for lack of water. The ground is often impervious and the water runs off in frightful torrents as fast as it falls. If it is sandy desert it disappears. The thirsty sand swallows it up, and a foot down you can kick up dry dust, though the storm seemed as if it might have soaked through the whole world. And in

Photo. by C. C. Pierce & Co., Los Angeles, Cal.

A PLAYA ON THE COLORADO DESERT

the dry times what will not a man drink? Oh, you city dwellers, who must have distilled water and Apollinaris and Shasta and iced drinks, think just once of the poor prospector at an alkali pool! Stagnant, dirty, full of filth, a standing place for animals and fearful night creatures, bitter, salt — yet that is all he can get. It is lukewarm and sickening. And what encourages him through all these trials? He "hopes" to strike it rich. He has what the phrenologist would term a well-developed organ of hope. He is imaginative. He sees visions. He dreams dreams. He doesn't look like an idealist; his hands are horny, his nails untrimmed and black-bordered, his hair and beard are unkempt, and if he ever shaved no one now would know it. His eyes seem ever bent downward to the earth, and his lips are as thick

Burros rolling

and sensuous as his eyes are dull and heavy. Yet he is a dreamer. He can see in these inhospitable, barren plains or these dreary, sandy deserts or these rough and rugged slopes pockets of the precious metals. He can see his pick discovering them, and then, in succession, the shaft, the drift, the stope, the bonanza, the mill, the bricks of precious metal, and the hoard at the bank. He sees his wife in silks, satins, and diamonds riding in her carriage drawn by fiery horses driven by liveried coachmen; or himself in an automobile with a French chauffeur. He sees a brownstone front, with lackeys innumerable, and a table covered with finest linen set forth with cut glass and silver and loaded with every delicacy the markets afford. Who sits at the head there? Who moves about in this lordly mansion, smoking twenty-five-cent cigars and giving orders with consciousness of

power and right? Who saunters into the library to meet distinguished guests or to greet the flower of society in the parlor or drawing-room? It is he, the dreamer, the prospector, the burro-driver, the eater of flapjacks and bacon, the sleeper under the stars, the shelterless wretch of the storm.

Ah! there is an allurement in these dreams that exercises such a power of fascination over minds as renders weak the bewitching enchantment of a Lorelei or the singing of the sirens. Once let a man yield and his course of life is cut out for the whole of his days. Should he strike it rich his dreams will come true. He sees the Clark mines of the Verde at Jerome. He remembers the Copper Queen, the Anaconda, the Comstock.

But, alas, should he be taken ill! Who is there out in that forsaken place to care for him? He tries his simple remedies, in his extremity tries herbs the Indians have shown him how to use. He is too weak to gather wood, to go for water, to light a fire. He grows weaker day by day. Now and again he faints, and the hours fly past and he wakens parched with fever and the deadly glare of the unsympathizing sun. His burro wanders off forgotten, the rats and other vermin come and watch. The timid lizards even approach nearer. The cottontails look on with great, brown, liquid eyes, and even the dread of the desert, the rattlesnake, comes and coils upon his breast, starting with surprise when the yet alive wretch makes some meaningless movement in his pain. The hours pass. The darkness of night follows the brilliancy of the day. Still he lies, but he moves not. The lizards runs over his face and he makes no stir, the rats gnaw at his flour sack and he hears them not. There is a flapping of wings heard above, and a great black, bald-headed bird with hideous beak and great bleary eyes swoops down upon him, and dreams and dreamer are at an end.

Recently I met an old soldier prospecting on the desert. He fought at Chickamauga with the 59th Ohio. He was now, though old and feeble, prospecting for gold on the desert. When I asked him how many claims he had he replied, "I've eleven grandchildren, and there's one for each. I never expect much for myself, but they'll all be rich." And then the poor old fellow took a bottle out of a sack, from which he drank to the

success of his mine, saying, "You'll excuse my not offering it to you. It's only rain-water." The miners and teamsters were all kind to him, bringing in the few supplies he needed and helping him wherever possible, yet there was a deep pathos in the sight of the old man, one foot in the grave, tottering along slowly and carefully, creeping with painful deliberation over the rocky trails, peering everywhere with eyes that should be at rest, for indications of the gold that is to make his grandchildren rich.

I once asked an old and experienced prospector what advice he had to offer to those who thought of going on to the desert in search of the precious metals. His immediate response was, "Tell them to stay at home." He then continued: "To be a good prospector a man must be well prepared in a variety of ways. He must be able quickly to determine the general character of the country over which he passes, hence he must have some knowledge of dynamics, general geology, mineralogy, and chemistry. He must have nerve and backbone, for danger is his constant companion, yet he must be most cautious, for foolhardiness is quickly rebuked on the desert. One day of risk, going without water, or attempting to go too far, may have fatal results. In wandering into these ranges alone one should always put up small monuments — just a few stones piled together — to show the way back to the nearest water-hole, for many a man has lost his life through being unable to get back to where he last watered. The fact of the matter is there are very few men qualified to be prospectors, and that is the reason so few, comparatively, succeed. With most of them it is pure good luck. If they strike anything it just happens so. The major part of the men now out had far better be at home."

After the winter rains the trails often almost disappear. The plants and flowers soon cover what the water has failed to wash away. Then is the time for the prospector to be careful. With such uncertain trails, and the danger of being lured away by the trails of the mountain sheep, he may find himself miles away from his destination and with nothing save his own judgment — which may be good or bad — to guide him over the maze of gullies, ravines, draws, divides, ridges, canyons, and valleys with which he is beset.

One could fill several books with the stories that are told of the peculiar characters of some of the old desert prospectors. Old Quartz Wilson is one of them. He had the prospector's high hopes, and his equally vivid imagination. Every time he came in from a trip he brought specimens of quartz which he solemnly informed you were simply "buggy" with gold. "Why, man, that's thousand-dollar quartz if it's anything," he'd say. That's how he got his name, — Quartz Wilson. His exuberant imagination and enthusiastic eloquence have fooled many a man. He would expatiate on the value of his ore and the extent of his prospect, until those who did not know could vividly see a valuable mine before them. Lured by the golden picture, they would make overtures to Quartz to take them out to see it. Then one should have been present to hear the flow of rhetoric. It was brilliant, and all on that dazzling subject, unlimited gold. Arrangements would be made, teams provided, "grub" enough for a party for a month, and with a confidence born of his own imagination Quartz would drive off into the desert to show his victims his "mine." For by now his prospect hole had developed into a mine worth half a million.

An old prospector

One perhaps may imagine the disgust of the tenderfeet as their illusions were dispelled. Yet even this was done in a tactful manner. Quartz would not take his visitors directly to his prospect hole, but would spend the first day in driving around, —"showing them the lay of the land," he called it. The next day he would give them an idea of the extent of the ore possibilities by showing them all the scratchings he had made, here and there, in the range. Then, as they grew impatient and asked, "But where's the mine, Quartz?" he would be compelled to confess that the only mine he had was a prospect hole. In another chapter I have told of our meeting Quartz at Twenty-Nine Palms, and the fact that although such stories as the above are told of him he is an expert prospector and has discovered some good mines.

It is not my purpose to exploit the mines of the Colorado Desert, and there are too many to describe in detail. I deem it best, therefore, to give the full history of one unpretentious and typical mine as broadly representative of the others. First comes the prospector; he discovers the ledge. If the ore assays well he locates upon it and it becomes his "claim" or "location." This necessitates the doing, each year, of not less than one hundred dollars' worth of work upon it, which is called "doing the assessment," and which must be done annually until the claim is patented. A patent is granted by the United States whenever five hundred dollars' worth of assessment work has been done, and this entitles the holder to surface land, 1,500 feet in length and 600 feet in width, with all the minerals underneath it. If the locator fails to do his assessment work his claim may be "jumped," that is, relocated by some one else. Each year the locator must make affidavit that he has done his work. If this is not done he is liable to lose his claim by another person's relocation. When he secures his patent all assessment work ceases, for the patent is practically a deed to the property, which can henceforth be sold or transferred as any other property. But, as will be seen from the following history of the Brooklyn Mine, the securing of a patent does not make a "mine." The prospect hole must be developed; *shafts* must be sunk, *levels* established, the extent of the *pay streak* discovered, *winzes* (blind shafts that do not come to the surface), *drifts* (tunnels which connect with some other tunnel or shaft and not with the outside), *stopes* (a following of the ore body from one level to another), *inclines* (a sloping shaft leading from one level to another, higher or lower), together with *galleries*, *cross-cuts*, *chutes*, *upraises*, and *air-shafts*, made as required. All this is expensive work, and is called "developing the mine."

In some cases, where large capital is interested, all this is done at once, with as great speed as possible, regardless of expense. But in the case of a smaller mine, or one handled by men with smaller capital, it is the aim, as far as possible, to make the mine pay for its own development. This has been done in the case of the Brooklyn Mine to which I will now devote my attention.

The Brooklyn is a busy little mine of two three-stamp mills

located in the heart of a small canyon of the Pinto range. After a weary twenty-three miles from Cottonwood we rounded the point of the canyon and slowly plodded along up the rough and rugged road to the camp. Up a steep hill cut in the face of the granite, on the side of which the new mill is erected, on to its crest, and there, snugly ensconced in a granite "pocket" we found the camp. Houses, kitchen, dining-rooms, stable, quarters for the men, and the mill, the latter perched on a knoll above the former, had changed the aspect from one of wild, untamed wilderness of rocky grandeur, to one of man's occupancy.

These mines were discovered in 1890–1 by John Burt, an old-time prospector of the district, whose name is preserved in Burt's Lake. In 1892, Burt and Botsford, the latter a mining man of Los Angeles, located several claims in the region and worked them together for some time. They then dissolved their partnership, and in the division of their interests Botsford took these claims as his, while Burt preferred those on the other side of the mountain. Botsford continued to work his claim until 1899, doing little more than the necessary development work required to hold it, though he did ship a few tons of ore to the mill to learn definitely the value of his ore body.

In 1899, Messrs. Ames and Yaeger, two Oregonians who were looking for a mine, and who had traveled through California, Arizona, New Mexico, and part of Mexico in search of what they wanted, decided that these claims would suit them. The price and terms at which they were offered enabled them to handle them, so the transfer was made and they became the owners. Ames was a practical miner and at once proceeded to develop the mines as rapidly as their limited means would allow. A three-stamp mill of the standard type and weight was erected, so that the ore could be worked on the spot. It was found to be rather a difficult ore to work. The ore rests in contact with talc matter, and when this is crushed and wet in the mill it makes a slimy mixture that renders the amalgamation of the gold with the quicksilver very slow. Another disadvantage of the slimy character of the mixture is that the quicksilver amalgamates with the baser and the useless metals and this naturally retards the absorption of gold.

Water for operating the mill and also for domestic purposes

had to be hauled during the whole of this time from Cottonwood, twenty-three miles away, every gallon costing fully five cents, so that the disadvantages of operating can well be seen. For two years, however, the mill was kept in pretty steady operation, enough ore being taken from the claims to pay for the extension work, or the fuller development of the mine. At the end of two years Yaeger sold out his interest, and Ames, with three others, incorporated the "Brooklyn Mining Company," with two hundred thousand shares at one dollar each. The shares were all taken up by the incorporators and none were placed on the market. The new company at once proceeded to put in a water plant of their own. They dug a well one hundred eighty feet deep in the bed of a dry lake, known as Burt's Lake, on the other side of the mountain, seven and one-half miles north, laid pipes to the Brooklyn, installed a pumping plant, with adequate tanks, etc., and were soon raising water from the well to the mine 1,200 feet higher and on the other side of the range. This required a ten horse-power engine, and the pipe used was from one to two inch inside diameter. The daily capacity of this plant was 7,000 gallons; far more than sufficient for all their purposes. It was found that they used about two hundred gallons of water for every ton of ore crushed. In 1904 the "Seal of Gold" Mining Company bought a half-interest in the water and pumping plant (as they were practically without water and the Brooklyn had an excess supply), and a corporation, composed of officers of both mining companies, was formed to operate the pumping plant. A price is charged both mining companies for the water, ranging from three-eighths to one-fourth of a cent per gallon, according to the amount used. After the expenses of operation are paid any surplus in the hands of the Water Company is divided and is thus returned to the owning mining companies. The water is fairly good — for the desert — though the solid matter amounts to eighty grains to the gallon, and the sulphate of lime, chloride of sodium, salts of magnesia, borax, gypsum, etc., give it a taste that is very noticeable to one from "the inside."

Yet the miners tell me that in a week or so after coming to the mine they not only fail to notice the peculiar flavor, but miss it when they return to "ordinary" water.

The mine is now well enough developed to show reasonable promise. The main shaft is down two hundred seventy feet and at the fifty foot, one hundred foot, one hundred fifty foot, and two hundred foot levels, as well as at the lowest level, tunnels have been run and winzes made so that the ore body is largely exposed and ready for "stoping." The ore is quartz in a diorite formation, and the ledge is well defined, though the whole formation is considerably shattered. As before remarked, there is a large amount of talc matter in the ledge.

At the time of my visit in April, 1906, a new mill of a special type for the handling of these slimy ores was being put in place, and ere this it is doubtless in successful operation.

This new machinery has put the mine somewhat in debt, but as all the ordinary development has been made to pay its own expenses, and this has been carried on to such an extent that large ore bodies are already exposed, it is a certainty that a very short time will see all debts cleared off and the mine will then bring in a sure, steady, and substantial return to its owners. This is what I call legitimate mining, an industry that is highly honorable and commendable and as entirely opposed to the stock-jobbing operations of the so-called financiers of our stock exchanges as is the work of the toiling farmer in the field opposed to and different from the wheat manipulators whose chief desire is to "secure" and "hold" a corner.

The difficulties of mining in such inhospitable localities are hard to appreciate. Some of these I have already referred to. But in addition there is the great distance from supplies. Even suppose a mine has telephonic communication with the "inside," that does but little to relieve the pressure. Something goes wrong with the engine, a cam of a machine breaks, a new wheel is required. Everything must stop until it comes. A telephone and telegraphic message is sent to the foundry in Los Angeles or San Francisco. The urgency of the case is stated. The required article has to be made perhaps. Then it must be shipped. If heavy it comes by freight. If lighter, by express. It reaches the nearest station, as, for instance, on the Southern Pacific, Palm Springs, Indio, Mecca, or Ogilby, or, on the Santa Fé, Amboy, Bagdad. From thence it must be hauled either

on the express stage at a ruinously heavy charge, or wait until a wagon can be sent in, — a trip which requires not less than five or six days. So that even when dispatch is used and things come by express at five times the original cost of the article, from one to two weeks are required, while if they come by freight and wagon from three to four weeks are expended. During all this time the mill, or engine, or pumping plant is at a standstill. Other work must be found for the men thus thrown out of employment, as it would be unreasonable to expect engineers and others to lose their work and wages under such circumstances, even if it were not impossible to secure fresh men to take their places were they dismissed or allowed to return "inside."

Picacho (the peak) and Picacho mining camp

Then, too, think of the isolation of men thus thrust out from intercourse with all but very few of their fellow men. The refining influences of women can seldom be felt, for lumber and labor are so expensive that the mine owners cannot afford to make provision for housing the wives and families of their men, and even if they could and did there are few wives who would be willing to submit to the social isolation and physical discomforts of desert life.

Hence many desert mines are favored with little female society, which the miners largely deplore. Yet they are a happy and cheerful lot as a rule, and make the best of circumstances they cannot help. They have their own way of looking at things and also their own names. For instance, a desert miner calls

his valise a "turkey," and if he goes "inside" without his blankets and with only a small valise, or one which contains little, he is said to "fly light."

In writing of the difficulties of desert mining I overlooked the question of fires.

At the Brooklyn Mine they use mesquite for fire-wood. In 1906 they are sending wagons a distance of twelve, fifteen, and eighteen miles for a supply. The superintendent says that his men report it is now so scarce that next year he must plan to secure coal, for wood will be too far away to pay the cost of cutting and hauling.

As we started off from the Brooklyn the superintendent nonchalantly handed to one of the men who was going "inside" a gold brick — not the fictitious, but the real thing — which, he informed me, weighed six and one-quarter pounds. At $200 a pound, this small and insignificant looking brick was worth $1,250.

In addition to the precious metals there are other important mineral deposits on the desert.

Semi-precious stones have been found near Pala, and on the edge of the desert near San Felipe.

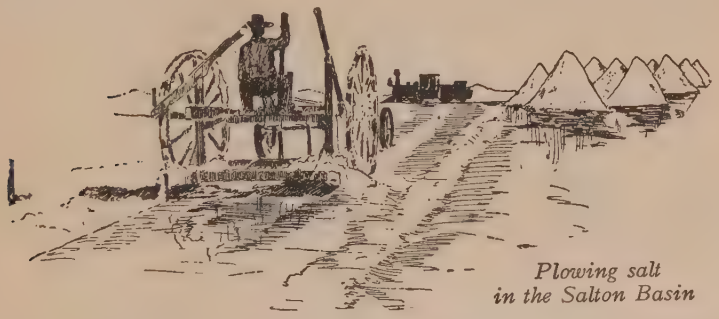
Mica has also been found, but not in large enough quantities to pay. Yet I am convinced that subsequent search will find large deposits both of mica and asbestos. These minerals are yearly in growing demand. Mica is becoming extremely valuable owing to the fact that the amount used in the United States has increased very largely. In every electric-light bulb there is a mica washer, mica being the only suitable insulating medium known. It is also used in stoves, lanterns, and Welsbach chimneys. The demand for sheet mica is greatly in excess of the supply, the only mica found in the United States at the present time coming from the mines of New Hampshire and North Carolina.

Ground mica is used in great quantities in the manufacture of mica axle-grease, which is used by many of the railroad companies as packing for oil-boxes. It is also used largely in the manufacture of wall-paper, of fire-proof roofing-paper, and for the packing of fire-proof safes. Ground mica in the East

fetches from three to five cents per pound, and is greatly in demand.

It is almost indispensable in modern manufacture. There is nothing that takes its place as an insulator in electrical machinery. The government uses it as a covering for compasses, and it is sometimes used in windows, as the concussion from the firing of heavy guns does not break it like glass. Mica is used extensively as a covering for steam-pipes, to take the place of asbestos. Nearly all fire-proof material is manufactured with mica as a base, owing to its efficiency as a non-conductor of heat.

Asbestos is equally valuable, and I have seen fine specimens found on the desert in San Diego County.



Plowing salt in the Salton Basin

In one or two places on the desert indications of oil have been found. At one spot these were so pronounced that the finder went to Riverside, organized a company, which sent out a boring outfit to drive a well. The well was driven about one hundred feet down, when a flow of gas was struck. An explosion followed, the derrick was overthrown, and everything wrecked. The work was abandoned and nothing more has been done with it.

In the San Jacinto Mountains, a few miles northwest from Mecca, Mr. J. P. Read discovered a deposit of marble. It was opened and the stone found to be of excellent quality, and of a pure ivory white, almost like a billiard ball. Unfortunately it does not occur in unbroken strata. As far as the mine, or quarry, is now developed the marble is not in large enough sections to

make it commercially valuable. The quality is the best yet discovered on the American continent, and eminent sculptors have declared it equal to the finest Carrara for the purposes of sculpture. As the largest pieces, however, are only about eight or ten inches square, it is practically useless for the art. It is most probable that the breakage or shattering of the stratum occurred during one of the seismic disturbances of which this region is a center. It may be possible, however, that further development of the mine will reveal the marble unshattered and in large mass. It will then become a most valuable property, equal, indeed, to a good gold or silver mine.

Before the great flood of 1905–6 which converted the Salton Basin into the Salton Sea, vast deposits of salt were found near the station of Salton. When these deposits were

The new Liverpool salt-works

first discovered, some thirty years ago, they were found to be unusually pure and free from sediment, and subsequent workings of the stratum have shown that this is a dominating feature of the deposits. It is interesting and important, therefore, to look somewhat into the geological history of this salt and seek for the cause of its deposition and unusual purity. It is generally regarded that there are but two ways of accounting for the existence of a salt lake, viz., 1. That it is caused by the isolation of a portion of sea-water in the process of uplift which changes the sea-bottom to land. 2. By the constant concentration of river-water in a lake which has no outlet.

In the first instance it is readily seen that if there be an uplift of a sea-bottom region so that a portion of it is shut off from the main ocean, the isolated waters will be salt as was the main body. As evaporation takes place the deposition of salt will

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THE SALTON BASIN AND THE SALT-WORKS BEFORE THE RISING OF THE SALTON SEA

occur. But as sea-water contains much gypsum, and this mineral is insoluble in saturated brine, it is always deposited first, and upon it occur the successive layers of salt. But in the meantime the rivers emptying into the lake are bringing down their constant supply of sediment and also of more saline matters chemically extracted or washed out of the rocks and soils through which they pass. These are also deposited, so that the beds possess alternate layers of sediment and salt. These are of varying thicknesses owing to the volume of flood waters and the amount of sediment poured into the lake basin.

In the second case the concentration and deposition of the salts and sediments are so complex as to render the salt almost valueless.

The unusual quantity and purity of the deposits in the Salton Basin, therefore, cannot be accounted for by either of these methods, and some other source must be found for their existence. This I am assured is found in the hot salt springs which exist near the mud volcanoes elsewhere described. As there stated, in the very midst of the bubbling quicksands and mud was a large natural bowl into which hot water and steam were being forced as if through a vent-pipe. It hissed and roared so as to be heard for a long distance, and the steam rushed out in large volume. I had no thermometer by which to determine the heat of the water, but it was evidently very hot. The bowl itself was of solid travertin and pieces of it rang musically when struck. Connected with this bowl was a small lake or pond of greenish-looking water. On tasting it I found it so salt that it surprised me into swallowing a mouthful, to my intense disgust. Here, then, we have the source of the salt. The hot carbonated and saline waters carried their burdens into the lake. The carbonates were deposited in the form of travertin, several masses of which are found in the Salton region, while the saline matter was deposited in beds ready for the discovery of man in the nineteenth century, to be worked and mined for a while, and then to be buried again under the waters of the newly formed Salton Sea.

Professor Bailey of the California Mining Bureau calls the barren part of the Salton Basin a "playa." When this portion

of the Gulf of California was shut off from the main sea and formed a lake, as evaporation took place the irregularities of the floor of the lake were ultimately revealed in pools of comparatively small area. The Salton Basin is thus the bowl of the valley, surrounded by its encircling mountains. This bowl naturally received the concentration of salty and other sediments in the water, and when the final evaporation took place the whole bowl was so permeated with chemical constituents hostile to verdure that nothing grows naturally in its area. This soon becomes covered with a coating more or less thick with mud, and these mud plains are *playas*.

The lake that existed prior to the playa Professor Bailey names Le Conte Lake after Professor Joseph Le Conte, the geologist of the California State University, one of the greatest of the world's dynamic geologists.

The New Liverpool Salt Company began work on the salt beds of the Salton Basin in 1884, and produced that year some 1,500 tons. Its location is 75 miles west of Yuma and 180 miles east of Los Angeles, and its elevation is 265 feet below sea-level.

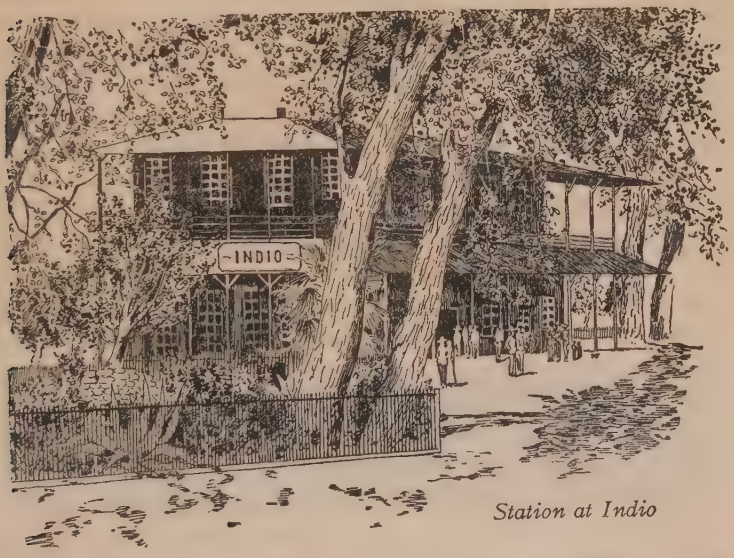
Two analyses of the salt show its remarkable purity, there being an absence of earthy chlorides and sulphates:

Sodium Chloride	94.68	97.76
Sodium Sulphate	.68	.70
Calcium Sulphate	.77	.38
Magnesium Sulphate	3.12	
Water	.75	.96
Insoluble		.20
	100.00	100.00

Owing to this purity none of the ordinary machinery of salt-works was needed, the mill plant consisting only of machinery for grinding and bagging the salt for shipment.

During active operations at the works the sight was most interesting. A number of Coahuilla Indians, strong, finely formed men, did the work. The salt was plowed by means of

plows attached to bands that traveled across the salt bed from one engine to another. The furrows cut were eight feet wide and six inches deep, and each plow was capable of harvesting over seven hundred tons per day. The salt was then scraped up into immense piles and conveyed by a tram railway to the works where Japanese and Indians ground it, sacked it, and shipped it to the various markets. Its price varied from six dollars to thirty-six dollars per ton, according to quality. While there were over a thousand acres of this saline deposit, such was



Station at Indio

the richness of the field that comparatively only about a hundredth part of its area was ever worked. As soon as one crop was harvested, another would flow in from the springs before referred to, and as evaporation was exceedingly rapid a pure layer of salt, from ten to twenty inches in thickness, would be formed.

To show that the deposit must have been from the springs, I give the following results of boring:

1. Below the salt crust was six inches of mud, resting on

2. Seven inches of a crust composed of chlorides of sodium and magnesium.

3. Twenty-two feet of black ooze containing fifty per cent of water, and carrying both the chlorides and carbonates of sodium and magnesium.

4. The rest of the three hundred feet of the boring was in hard clay, with a few streaks of cement.

Burdick in his "Mystic Mid Region" tells an interesting story connected with these deposits that, with a slight addition, is worth retelling here.

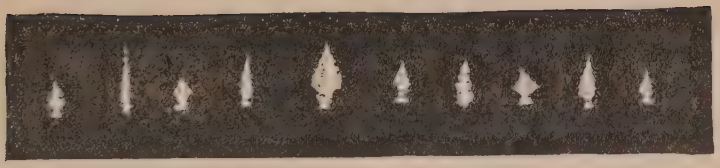
Until 1901 the title to the lands was vested in the United States Government, and the Liverpool Salt Company had no title to the property and no legal right to the harvest. A rival company, the Standard Salt Company, discovered that the new Liverpool concern had no title and at once called the attention of the government officials to the fact in such a way that they were compelled to act. The company was ordered to vacate. A bill was then introduced in Congress providing for filing claims upon saline lands, and the bill was duly passed by the Senate, January 22, 1901. While awaiting the signature of the President to make it law, things became interesting on the desert.

Each company had men on land adjoining the salt fields, with location notices written, ready to race to the choicest portions of the field, and post them as soon as the telegraph should apprise them that the bill was signed. Of course each company had its agent at Washington ready to send the news, which would be received at the telegraph station nearest to the salt deposits, viz., Mecca, over twelve miles away.

The Liverpool Company arranged for a gang of men to take out their messenger on a pump-car such as the section men use in doing their work on the railway. The other had a fine team of horses and a buggy ostentatiously in view, close at hand, and it was supposed that the locations would finally depend upon the race between this team and the pump-car. But wit and knowledge made it easier than that. A system of flash signals had been agreed upon, and when the long-expected message came, the one company sent off its locators on the car, while the other flashed its signals with a mirror to its representatives on the ground, so that when their rival appeared the notices were already posted and their efforts were found to be in vain.

After this triumph of the Standard Company a compromise was effected whereby it was placed on an equal footing with the Liverpool Company.

I have elsewhere recorded how the flooding of the Salton Basin by the waters of the Colorado River has completely drowned out the salt-works. Every vestige has disappeared. Even the hot springs that supplied the salt are submerged, and what will appear when the floods are controlled is as yet a matter of mere conjecture.



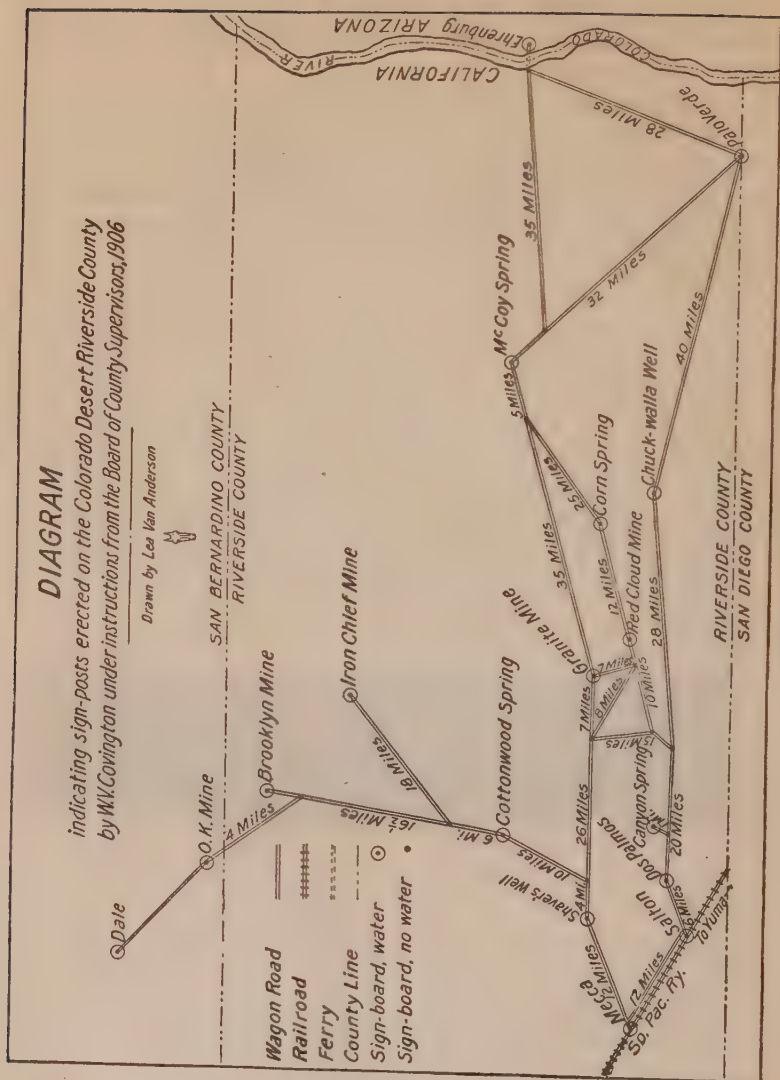


DIAGRAM
indicating sign-posts erected on the Colorado Desert Riverside County
by W.V. Covington under instructions from the Board of County Supervisors, 1906
Drawn by Lea Van Anderson
Wagon Road
Railroad
Ferry
County Line
Sign-board, water
Sign-board, no water
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
RIVERSIDE COUNTY
SAN DIEGO COUNTY
CALIFORNIA
ARIZONA
COLORADO
RIVER
Ehrenburg
Palo Verde
Dale
O.K. Mine
Brooklyn Mine
Iron Chief Mine
Cottonwood Spring
Granite Mine
McCoy Spring
Corn Spring
Red Cloud Mine
Chuck-walla Well
Shaver's Well
Mecca
Salton
Dos Palmos
Canyon Spring
Sp. Pac. Ry.
To Yuma
4 Miles
16½ Miles
18 Miles
6 Mi.
10 Miles
4 Mi.
12 Miles
26 Miles
7 Miles
8 Miles
15 Miles
10 Miles
12 Miles
28 Miles
25 Miles
35 Miles
5 Miles
32 Miles
40 Miles
28 Miles
20 Miles
6 Miles

CHAPTER XXI

Sign-boards on the Desert

IGN–BOARDS in cities and on roads in populous countries are regarded as imperative necessities. What then must they be to men out on the desert where trails are often obliterated, where there is no one "standing by" to whom you can turn for direction, where there is not a house or a camp for a score of miles, where water-holes or pockets or wells are far apart, often hidden and hard to find, where it is impossible to carry much water, and where the heat is often so intense that to be without water is to court swift and certain death?

Only those who have wildly wandered about hunting for a water-tank, or pocket, or a hidden spring, or have stood in bewilderment at a fork in the trail, uncertain and indistinct at its best, can tell the crying need for sign-posts on the desert. Scores of men have lost their lives through the slight mistake of turning to the left instead of to the right, and as many more have perished of thirst when water was within their reach had they known just where. Yet such is the nature of many men that, just so soon as their own danger and peril are over, they forget the need of others similarly circumstanced, and in the immediate pressure of their own necessities leave "the other fellow" to fight his own battles. But once in a while a man will have an experience that calls forth all his sympathies for his fellow men in similar circumstances. It arouses him to personal action and vigorous agitation as to the needs of his fellow travelers. Such has been the case on the desert. Several city men, used to a sign at every street corner, going out to visit prospects or mines on the desert, improperly guided perhaps, going weary miles on the wrong trail, finding themselves in desperate straits for want of water and want of knowledge as to its whereabouts, have returned to civilization

possessed with a strong desire to better such conditions. They have urged Chambers of Commerce, Mining Boards, City Councils, County Commissioners, State Assemblies, and Senates to remedy the evil and minify the dangers by placing sign-posts on the junctions of the roads and trails and also pointing out where and how far away water is to be found.

The first step in this humane and important work was undertaken in San Diego County.

In 1895, James A. Jasper of San Diego, California, then a supervisor of the Third District of San Diego County, at the expense of the county and district road fund, placed guide-boards a mile apart on the Yuma road from Campo to the Mexican line, and also from the San Felipe ranch, along the old Butterfield stage road to Laguna, where a junction was formed with the Campo line. Each guide-board was of iron and gave not only directions and distances as to the road, but also to the known water-holes on the desert, and was placed on a post made of large gas-pipe which was well-grounded. The directions were painted on the iron, but unfortunately many of them are not legible to-day. It is a great pity that Mr. Jasper's work was not followed up, and guide-posts placed on every road and trail, and especially giving directions to desert travelers as to the location of the water-holes. The need to-day is greater than ever before, for, as the country increases in population, a greater proportion will desire to go out and prospect on the desert for precious metals.

One of Supervisor Jasper's guide-posts

One has but to read the "Precious Metals" department of the *Los Angeles Times* to see the growing interest there is in this subject. An expert is engaged who answers questions about the value of minerals of different kinds. Hundreds of men are

ABOUT TO TAKE A SAIL ON A PLAYA ON THE COLORADO DESERT

already engaged in prospecting and hundreds more each year go out on the same fascinating but solitary, arduous, and dangerous undertaking.

Where the state and county have failed to make provision in this regard those who have located prospects often put up rude sign-boards of their own. I have often met with such on my desert wanderings.

Sometimes you will come to a trail or road branching off from the main road, and there you will find a primitive sign-board and mail-box, — the latter generally a condensed milk box or one that has held a wholesale supply of patent medicines. The lid is fastened on (when there is one) with leather hinges, and on it will be some such legend as "Please leave and take mail. J. S. Crawford, San Diego and Granite Mine."

What primitive simplicity and faith in man's neighborly helpfulness! If a man is at the post-office thirty-five or more miles away and knows he is coming "by way of Crawford's," he suggests to the postmaster, "You'd better give me the old man's mail." He takes it along and leaves it in the box as he passes by. Another casual passer, going to town, seeing mail in the box takes it and duly drops it in the letter-box when he arrives.

Early this year (1906) Riverside County took hold of the sign-board question in a thorough and businesslike manner. The county supervisors decided it was time to give protection to the small and quiet army of men who seek to add to the wealth of the country by the discovery of the precious metals, and they ordered that sign-boards be placed on every road and trail, and wherever it was deemed wise to direct to wells, water-holes, or pockets on the whole of the desert area comprised in their county. A man thoroughly familiar with the desert, Mr. William Covington, was entrusted with the work of determining where the sign-boards should be placed, the computing of the distances to be marked on the sign-boards, both to mines and water-holes as well as desert settlements, and finally with the work of putting the posts in position. On one of my desert trips I met Mr. Covington and his assistant during this work. The posts were of thick piping, anchored to the ground to iron crosspieces. The sign was of perforated zinc, so that the storms of a thousand years cannot

obliterate the directions given, so long as the posts remain standing. In many instances I tested the distances as closely as I could estimate without instruments, and found them accurate. A mining man recently tested some of them with a roadometer and found them correct. The result is that any intelligent child can now traverse the desert, as far as Riverside County is concerned, and by the aid of these posts go with safety and certainty in every direction. Personally and on behalf of the small army of prospectors and desert travelers I wish to extend to the officials of Riverside County cordial thanks for the performance of this long-needed service, and to assure them that few of their official acts will secure for them more lasting and hearty praise than this.

Old cave dwelling in Tauquitch Canyon

To arouse the state and his own county, Mr. George W. Parsons, a mining man of Los Angeles, after making an arduous desert trip and feeling the need of these signs, at once set to work with characteristic energy to secure official action. February 3, 1904, the Los Angeles Chamber of Commerce, at his suggestion, called the attention of the county officials to the recent discovery of thirty or more victims of thirst on the desert, and urged the erection of sign-boards and the caring for the water-holes. As yet,

however, Los Angeles County has done little. The state has left the matter to the counties.

It is not altogether on the great highways of travel from district to district, where the road is now being well blazed by hundreds of people, that these sign-boards are most needed, but in parts where the lonely prospector finds himself isolated and perhaps lost for lack of some one to guide him aright. Many such a one has perished from thirst when within a few hundred yards of water.

But it is hardly enough to direct the thirsty one to water if he is to find it inaccessible for lack of something to reach it with, or so foul or polluted as to cause man and beast to sicken at its sight and smell. In all the work that has been done by the Los Angeles Chamber of Commerce the greatest stress has been laid upon the last suggested need. Buckets and ropes should be provided and provision made to protect the water from filth and prevent the well from becoming a death trap for animals whose decaying corpses ruin the water.

There are six counties where action is especially needed, viz., San Bernardino, Inyo, and Kern in California, and Esmeralda, Nye, and Lincoln in Nevada.

In Nevada the sparsely populated conditions of the entire state in the past has left the long-isolated, little-developed southern counties with but slight funds for any improvements. With the increased revenue from the new districts, mining men hope for an improvement in the conditions that will redound to their benefit.

It is sincerely to be hoped that not another year will pass before this lamentable lack on the desert will be abundantly supplied.

On the trail to San Jacinto Peak

CHAPTER XXII

The Tragedies of the Desert

THE tragedies of the desert are numberless. Its dry sands have taken their large toll of human life even as the sea has taken its toll.

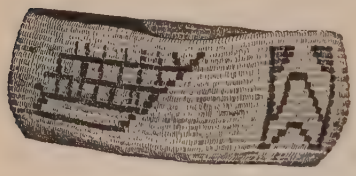
This chapter is not designed to be an historical recital, but merely a suggestion of the kind of tragedies that have occurred. The deaths on the march of those going to and fro, the simple head-boards, their inscriptions cut with pocket knives, and oftener without more than a written inscription, used to be very common on the desert. Even now it is no uncommon thing to read an item in the local papers similar to one which I saw the other day. It told of a skeleton being picked up between McCoy's Springs and the old Chuckwalla Placers. Only the skull and parts of the bones of the trunk were found together. Near by was a gold watch. There was also an unused gold pan with the remains.

A man named William M. Thompson made the discovery and he wrote the officials as follows: "We put the bones in a shallow hole and marked the place with four greasewood sticks tied together at the top with a red handkerchief. We had nothing else with which to mark the remains." This was in December, 1905.

Some time later another item appeared stating that a wagon and miner's outfit had been found not very far (a few miles) away. This outfit was supposed to belong to a prospector and miner named Raidamaker, who had been lost — had totally disappeared — for nearly three years. He had some locations in the desert in San Bernardino County and was on his way there when he was lost. It is explained that most likely his mules got away from him, and he thoughtlessly started out after them

without a supply of food or water. Sure it is that he never returned, and his deserted wagon was left to rust and disintegrate in the sand-storms, winds, rains, and torrid heat of the desert.

This was supposed to be the rational connection between the skeleton on the one hand and the deserted wagon on the other, but the other day (April, 1906) as I came from this region to Dos Palmas I found an old miner and prospector, named Baker, camped there, who asked me if I knew anything further of the skeleton the discovery of which I have related above. When I told him no, he said: "I believe that was a German named Davids who started out prospecting with me thirteen years ago from Yuma. We aimed for the Chuckwalla Mountains. We were strangers to each other, but when we met in Yuma and found we were both on the same errand we made up a partnership and started out. We reached Mule Springs all right, and the morning after our arrival he started out to prospect. He didn't come back that night and I got quite uneasy, so when morning came and I had had my breakfast I couldn't stand it any longer and between nine and ten started off to look for him. I followed his trail for quite a while until a sand-storm came up and I had to quit. The next day I tried again and caught his trail on the flat where the wind couldn't blow it away, but another and fiercer sand-storm came up and it was so hard on me that I had great difficulty in getting back to the springs. I lay there sick for some days and then concluded I had better go back to Yuma. I never could find hide nor hair of Davids, and from the fact that he had a gold watch and a new gold pan same as they say were found with the remains, I put it up that they were his. Poor Davids!"



A Coahuilla basket

What a field for tragic imagination lies in this very simple statement! That a man can be lost for thirteen years and no trace of him be found, and that when bleached and scattered bones are found there are more than one claimant for them,—

this is to suggest the possibility of many desert horrors that can never be written, because they can never be known.

It is not the white man's mental habit to think much of the Indians in connection with the word "tragedy." Let me here bring them into conjunction and present two or three pictures. The first finds two Indian sisters at Palm Springs happy and joyous together as young mocking-birds. Enter a white man. He likes Palm Springs because it gives him health and drives the pale and wan look from his cheek. The Indians are good to him and bid him welcome to all the valley and the desert can give of health and new life. As he improves he "makes love" to the younger of the Indian sisters. By and by they are married — according to Indian custom — and in time three bright, beautiful girls are born to them.

Then, almost suddenly, a change comes. Many other white men, and some women, come to Palm Springs. They have learned of its virtues and there is a "boom." What then does this white man do, who has received health, life, and love on the desert? The craven wretch is ashamed to be seen by his own people with an Indian wife and children, and, like an infamous scoundrel, he deserts them in the dead of the night. At first the deserted wife could not believe it, but when the fact penetrated its way into her mind, it at the same time broke her heart.

Think of it, good sirs and ladies of the superior race. Though she was "only an Indian," she died of a broken heart. Nor was that all of the tragedy of it. Prior to the time of her white husband's desertion she had been noted for the care and devoted love she bestowed upon her children. By one of those strange perversions we cannot always explain, the misery caused by being forsaken turned into hatred to her recreant husband and vented itself upon his children, so that they, poor innocent little ones, had a bitter life until their mother died. Then they were distributed around among the relatives. The mother's sister, Maria, took one of them. She had a motherly heart and immediately poured out the whole of its wealth of affection upon the deserted, motherless creature. She aroused herself to do for it as the white women do for their children, and many a

white visitor at Palm Springs commented upon the neatness and cleanliness of the Indian child, whose prior history they little imagined. When she became of school age Maria was urged to send her to an Indian school, which was done, but unfortunately the child came under a malign influence there. She was soon weaned away from Maria, and though the loving-hearted woman craved her presence, the girl was taught that it was far better for her never to go back to the reservation. Several years elapsed. The school was closed and the Indian children moved to the Sherman School at Riverside.

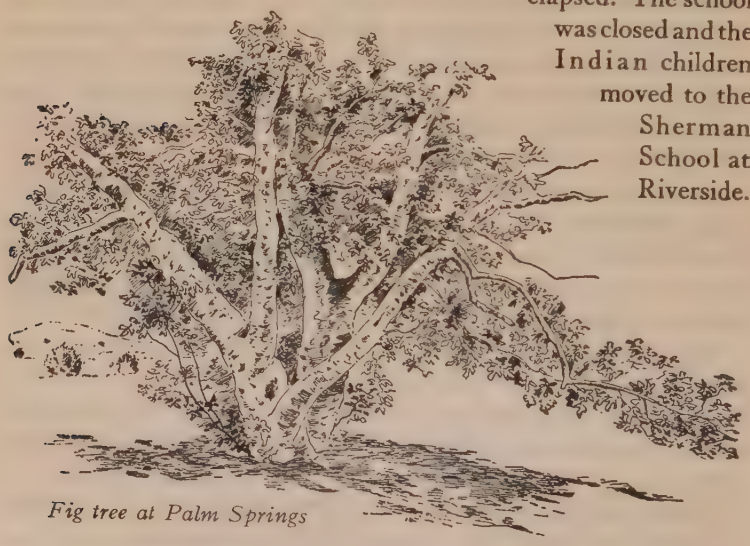


Fig tree at Palm Springs

Here, though the influence was of a decidedly different character, the estrangement of the girl from her aunt was completed.

In the meantime Maria longed to see her beloved niece (whom she had long regarded as her very own) with such a fervent longing that she became sick and soon developed a mild form of melancholia. Her brother sent a message to the school asking that the girl be sent home for a while, but no attention was paid to it. Then Dr. Murray was asked to intercede, and with the large heart of a true humanitarian, he wrote and begged that the child come home to save her aunt from complete dementia. He might have told, had he been aware of the facts, that poor

Maria was in the habit of getting out the baby clothes, the shoes and stockings of the child to whom she had given a mother's love, and wailing over them, as the Indians do over their dead.

Weeks passed and Maria rapidly became a hopeless lunatic, crazed through unsatisfied affection and the absence of her child. Dr. Murray wrote again, and this time his plea was so urgent that the girl was sent. She brought her mandolin with her, upon which she had become an expert player. She had grown to be a "fine young lady," but there must have been much of her heartless father in her, for she was very unhappy with her demented aunt and begged to go back to school.

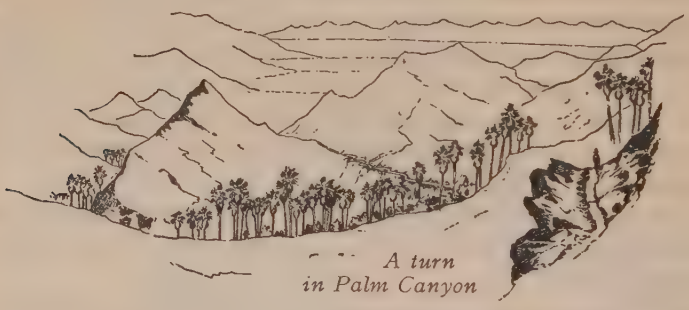
And now, when her brother is away, Maria still gets out the baby clothes of the child she loves and in a voice that is piteous in its sadness and despair she wails in her unquenchable grief. Then she forgets her sorrow, and in a wildly boisterous manner that alarms and arouses the whole village she sings the happy songs she and the child used to sing in the days when they were happy together.

And I, who have heard both the wailing and the singing, am unable to tell you which is the more sad. They both tell of a desert tragedy.

What numberless tragedies men's culpability has caused, and equally numberless those resulting from men's evil passions! The desert has seen its share of both of these. One of the earliest is that recorded by J. R. Bartlett of the Boundary Commission. As Colonel Craig, of his escort, was crossing the desert from Alamo Mocho to Yuma he came up with two deserters from Fort Yuma. He endeavored to persuade them to return, but they vowed they would never go and would shoot any one who attempted to arrest them. With a desire to conciliate them, Colonel Craig threw aside his weapons and was stepping up to them with the kindly offer that he would try to have them attached to his command, when his mule, being left alone, marched off some fifteen or twenty yards. The colonel directed Sergeant Quin (who with Sergeant Bale were his only companions) to stop him, and as he did so thus separated himself from the officer. In a moment Quin heard the report of muskets, and, turn-

ing, saw the deserters, who had just fired, and the colonel staggering and about to fall. Bale discharged his revolver at the deserters, but his mule prancing about, his aim was ineffective and Quin saw him also fall. He at once put spurs into his horse and made his way to Bartlett's camp as fast as possible. But that was thirty miles away.

And in the meantime over the prostrate body the inexorable sun shone on with unrestrained fury, the winds blew as if they knew not the silent figure; the curious lizards darted to and fro and the rattlesnake sounded his warning, not knowing that all earthly warnings were in vain. The night came and the pitiless stars and the unconscious, baby faced moon gazed down without



A turn in Palm Canyon

a sign of sorrow, and people far, far away gazed into the blue distances of the desert, never dreaming what lay out yonder so quiet and so still.

It was ten o'clock the following night before the detail found the body, and soon after the wounded sergeant, who had been allowed to go by the murderers. On their return to camp a deep grave was dug and the body of Colonel Craig was consigned to it. There was neither mound, rock, nor tree to mark the spot; a dreary solitude reigned: so to identify the grave a wooden cross was erected at its head on which was inscribed:

"Lieut.-Col. L. S. Craig, U.S.A.
Died June 6, 1852."

The murderers were afterwards caught by the shrewdness of an Indian chief, who, with his people, had been sent to hunt for them.

Professing friendship for the men the crafty Indian proposed to buy their muskets, which the deserters gladly sold. But as they had a revolver and it was necessary to disarm them of this, the chief expressed curiosity and requested to be allowed to see it. His apparent simplicity completely lulled any suspicion the deserters may have had, and they put it into his hands, when, immediately, he stepped back, leveled it upon the murderers, gave his signal cry and in a moment his hidden followers sprang in and arrested the two men. They were finally taken to San Diego, tried, and hanged in the presence of a large number of people.

But there are other tragedies that have no violence in them, and some of these are exceedingly sad. These tragedies come from ignorance. Men come and attempt to establish themselves in the desert and spend all they have in planting out things that will not grow. The sadness of such disappointments has often brought death; the weary continuance of the struggle has often prolonged the agony of death, and but few have moved on with courage enough to start afresh the battle of life under newer and less difficult (to them) conditions.

In Palm Canyon

Some of the saddest desert tragedies occur when those who could have been helped by the desert in pulmonary troubles come too late. Why will men and women delay facing the inevitable? Is it cowardice or fear lest they frighten the loved one? Which is better, to wait until the disease has secured so thorough hold on the body that death is almost certain, or to startle the patient and get him to a place of helpfulness before it is too late? I could write several large books recounting the stories of those who came "too late"! What sad words these are, and often how unnecessary! And yet in many instances one says them the moment his eyes fall upon the victims of cowardice, indecision, or criminal reluctance to warn the invalid. Such a case occurs to me now, of a bright and beautiful girl, born of

wealthy parents who could gratify her every desire. She was a proud and studious girl and resolved to win high honors at her school and then take a university course. Competitive examinations, the determination to surpass her comrades, and the fear of failure impelled her to work beyond her strength. She won the examinations, surpassed her comrades, entered the university, and — broke down, with affected lungs. Her parents buoyed her up with the hope that she would soon be well, and instead of taking her where the soothing and healing air of the desert would have given her new life, they resolutely refrained from giving her the slightest idea that she was in any danger. At last a violent hemorrhage demanded immediate action. The family physician sent her to Palm Springs. But it was far too late. Soon after she arrived the overworked body gave way and the spirit took its flight. It was decided to send the body home for burial. On the day appointed for this, a young man with his two sisters, both afflicted with pulmonary disease, were expected at Palm Springs. It was deemed unwise to shock them by allowing them to see the casket as they landed at the place where they hoped to regain their health, so, as there was an uncertainty as to the exact arrival of the train, a carriage was sent to meet them, while an Indian drove a wagon, on which was placed the casket bearing the body of the unfortunate girl, around by the mountains, so that it could reach the station by another route. Cared for by an Indian, dead, on the desert, hopes, ambitions, aspirations, beauty, achievements all gone, as far as this earth was concerned, here, indeed, was tragedy. But perhaps it mattered not to the dead girl with whom she rode, in what kind of a vehicle, or how she went and by what route: all drivers, vehicles, and routes were the same to her. It was the poor girl's "last ride."

CHAPTER XXIII

The Camp-fires of the Desert

AMP–FIRES are always delightful, romantic, and pleasant, but never more so than on the desert. When the pure pall of semi-darkness slowly falls and covers the clear brilliancy of the day and nothing but the dark shadows of the palms, the rocks, the trees, the wagons are to be discerned, the bright fierce flames of the camp-fire rise with peculiar charm and fascination. The breeze blows the flickering flames this way and that, as if in rude rhythm, and the picture is one which once seen will never be forgotten. Here is a tiny handful of men—in our case there were but two or three of us—in the heart of this desert solitude where even the silent stars sometimes seem so far away from the activities of men that they must have lost their way, and one thinks of the cry of the mate of Columbus:

> "Why, now not even God would know
> Should I and all my men fall dead.
> These very winds forget their way,
> For God from these dread seas is gone."

Yes! but is this being out in the heart of the great freedom that constitutes its allurement? No one is looking on, no one is criticising, no one is requiring you to be any other than you are. Here, at least, if you will, you may be yourself. And God is over all. There is no sense of aloneness, no sense of solitude: it is simply an overpowering, joyous sense of a great and glorious physical, mental, and spiritual freedom. The only laws, the only restrictions, the only restraints are those which God has indelibly written upon each human heart. With me there is such a sense of the presence of God on the desert that I always feel the farther

I go, the farther I get from the influence of men, the nearer I get to God.

By this I would not have my readers think I am a misanthrope, a recluse, a hermit. I have none of that blood in me. I merely long, at times, to be free from men and women, to get away from man-made laws and conventions to original things, to look again at my prime bearings, and then go back into civilization and take up my share of the white man's burdens.

It is around the camp-fire in the dusk of the evening, when supper is over, and one feels the comforting influences of a good meal, that men's tongues are loosened and stories of all kinds are told. The camp may be in the open, or under the shadows of a great rock, or in a canyon under sheltering trees. Where it is matters not much so long as the influences are there, — the gentle crackling of the fire with the occasional spurt of flame; the dim light; the careless, lounging attitudes of the men, some sitting against their blankets, others stretched out at full length, their chins propped up by arms and hands, another leaning against a tree, and still another holding himself by the knees; pipes or cigarettes lighted by the lovers of "the weed"; the mournful coo of the dove; the munching of the horses as they diligently masticate their quota of hay or grain; the gentle evening breeze, cooling yet not cold; the occasional bray of a burro who wishes you to know that he is not near enough to the hay, — all these and the more subtle influences of the desert, the solitude, the mystery, the evening stars, the entire absence of all civilization or evidences of the existence of other men than the few here gathered, tend to evoke those stories of imagination, of travel, of horror, of peril, of adventure, of experience, of fact, of fiction, that constitute the charm and delight to almost all men who have experienced it of the desert camp-fire.

It was at the camp-fire that I first heard the story of Pegleg Smith, of the Breedloves, of Riley and hosts of others. It was in the half-glow of the camp-fire that I learned fresh details of the Mountain Meadow massacre, of the Death Valley experiences, of the Donner Lake horrors. There many a discouraged prospector has told of his miles of weary travel, his disheartening experiences, his boundless hopes, his perils, his few trivial successes.

There, too, you learn somewhat of the difficulties and dangers of the teamster's life, the accidents on mountain slopes, the upsetting of wagons, the fording of dangerous streams, the sinking into treacherous quicksands, the sufferings endured by man and beasts when, in the almost intolerable heat of a desert summer, an expected spring is found to be dry, or an accident has ruined the precarious water supply.

As I read over the pages I have written about the explorers and pathfinders of the early day I see many and varied camp-fires. Think of the camp-fires of the weary soldiers of Kearney and Cooke as they journeyed to the land of promise in the days of the first American occupation of California. Cooke's soldiers were Mormons and they whiled away some of their time in singing. At their camp-fires they sang the songs of their new Jerusalem, the songs of their church with a zeal that deserts could not destroy and rivers could not quench. But now and again as they first stole around the camp-fire before their preachers had had time to begin their exhortations, once in a while one of the lighter spirits would start the song with the rollicking chorus in which they all joined:

> "How hard, to starve and wear us out
> Upon this sandy desert route."

But by and by these sounds were hushed, the solemn hymn rose on the evening air, and soon the voice of the earnest and zealous Mormon preacher rang out over the sandy wastes. Those were, indeed, camp-fires of a far different type from those of the early Spanish colonists, though at both the worship of God in religious ceremony formed an important part.

The bandit and stage robber have had their camp-fires on the desert. But they must be built where the eye of no hunting officer or sheriff could see. In the shelter of some rock or down in a dry arroyo a tiny fire was built for the cooking of the evening meal or to tell over the spoils. See them, these bloodthirsty and cruel men. They tell with glee how they made their hapless victim suffer, how they tortured him until he revealed where his wealth was kept; how they stole upon the unsuspecting traveler and drove the knife up to the hilt into his back and he died and

"never knew what had struck him"; of the stage held up and how the scared passengers lifted up their hands while one of their own number went through their pockets, gathering the spoils for the lone highwayman.

And they drink and carouse, perhaps, and forget they are being hunted. They found the seductive liquor on the stage and cannot resist the temptation to "drink it down" and forget everything but their noisy mirth. "Throw on more wood! Never mind the light! We're safe enough! Pass around the bottle!"

A Coahuilla basket-maker

And, suddenly, the crack of guns peals out and one after another they fall over. One or two spring to their feet and start to run, but the swift bullet is swifter than they, and ere they can escape they are brought low, one of them falling over into that camp-fire, a horrible sacrifice to the desert purity he and his companions have so shockingly violated. And time and space would fail me to tell of the camp-fires of the pioneers before '49 and those who came for gold and those who finally came with their families to make California their home. As I have sat at my own solitary camp-fire I have seen all these scenes and many more. I have peopled the desert with phantoms that are real. Here, in the awful stillness and solitude, imagination has full play. Memory and imagination have wedded and brought forth children that are more real than physical things. These have taken possession of my

camp-fire. The silent desert is the unreal thing, for how can it be desert, deserted, silent, still, with these living presences, acting, moving, loving, hating, before me?

One of the strangest camp-fire stories I ever heard was that told by the "Ananias of the Desert," whose bright invention has cheered many a weary hour. It was told with so earnest an air of truth that I believe the teller himself believed it. I give it as it was told.

"When travelers go to the Torres Indian reservation they will find an old Indian who sits in calm equanimity and listens to their ofttimes foolish vaporings. For it cannot be denied that some most silly things are said by white people about Indians in the presence of the latter. It is then rather astonishing to hear from this rather sardonic-looking old Indian the question expressed in perfect English or French: 'Were you ever in Normandy, madam? Are you not aware that we but do here what the peasants do there?' Such a question and remark, from such a source, is generally a staggerer, but few people are able to learn anything of the Indian who thus addressed them. But here is the story as it came to me. This man's name is José. When a young man he is said to have gone to a fiesta in Los Angeles. There he tasted of the red wine and it seemed very good and sweet to him. When again pressed to drink it was of the white wine, and that was equally good and sweet. 'But,' said he, in telling the story, 'my mind was not my own after that. Somehow I found myself in a strange country where I saw things I had never seen before. I was where the desert was of water, not of sand, and great vessels were moving noiselessly to and fro over its surface.'

"It is evident he had either wandered or been taken to the port of San Pedro, most probably the latter, for the next thing he remembers is that he was on board a vessel, far out at sea, bound for the Orient. While he thought he was enjoying himself he had been shanghaied. For several years he was kept on board the ship, and there learned to speak good English, — not from the sailors, but from one of the officers who took an interest in him. The captain, however, watched him so closely when they were in port that no opportunity was given him to escape, until

after several years they happened to be in a French port, and there the long-looked-for chance arose. José seized it, and a few hours' wandering found him a free man again in the heart of pastoral Normandy. He met with friends, engaged with a farmer to help him, and before long was speaking words of love in true Normandy French to a maiden upon whom his eyes had longingly fallen. She was not averse to his dark skin, and never knew or dreamed, perhaps, of his Indian birth, and he never told, so that when, a little later, he proposed marriage, the parents of the girl made no objection and the wedding took place with all due solemnity.

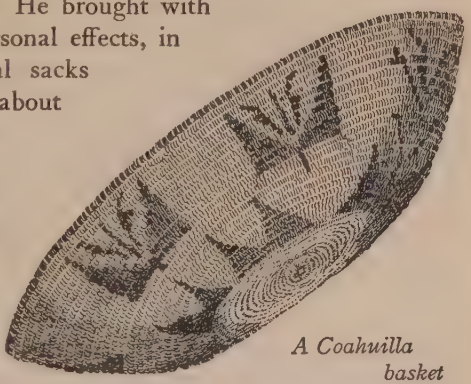
"Who says an Indian has no power of adaptability? Here was one who not only learned the language, but adopted the customs, and, at least as far as exterior goes, the religion of the people of his new land so that he virtually became one of them.

"See him now, for a dozen years or more, settled down as a farmer, with a small family growing up around him. For a while everything went well. The years rolled on and no one supposed that he was not contented and happy. Perhaps he never even dreamed of it himself. But by and by that ferment in the blood we cannot explain or understand, that 'call of Nature' made its subtle and gentle, though powerfully overwhelming voice heard, and José, all at once, felt he was 'not at home.' His home was elsewhere, — near the waters of the Pacific. He had forgotten many things, and his home tongue had almost entirely slipped from his memory, yet he knew enough to think he could find his way back to his birthplace if he once cut loose.

"No one can ever tell from the old man's way of telling the story whether he felt the severing of the new bonds or not. He says he left when everything was happy and prosperous and found his way into a port in Belgium. Here he shipped on board a German vessel which was carrying a load of cement to California. In due time the ship reached San Diego, and José lost no time. Not being watched, he escaped to the hills, and there fortunately came in contact with some old squaws whose features reminded him of those he had left at home so long ago. He asked of them how far away was Tauquitch, and they told him 'two days.' He secured a horse and in forty-eight hours the snowy forehead of

San Jacinto Mountain loomed before him. A few hours later and the mesquite huts of Torres were reached. Without a word he shed the life of recent years as a snake sheds its discarded skin, reëntered upon the life of his people, and now, save when his sardonic humor asserts itself, one would never dream that the old Indian sitting so quietly in the shadow of his *kish*, smoking his cigarette, was a world-wide traveler, the hero of a romance in France, and even now, perhaps, longed for and mourned by a sad-hearted mother of children in the fruit orchards of far-away sunny Normandy."

Two others of Mr. Tingman's camp-fire stories must find place here. "A gentleman from Ohio came here and filed on a desert-claim. He brought with him a car-load of personal effects, in the which were several sacks of fine pop-corn and about two hundred blooded chickens. A barn was built and a corral for the chickens, and the pop-corn was put in the former and the chickens in the latter. One morning when the proprietor went out he found a number of his valuable chickens with their heads off. He hunted around but could find no sign of the heads of his unfortunate chickens. In great distress he called in his neighbor, who at once began to look around for the cause of the disaster. Stepping into the barn he saw some of the pop-corn loose in a box. 'What's this?' he asked. 'It's corn,' replied the owner, 'pop-corn: I brought it from the East.' 'Popcorn?' exclaimed the neighbor. 'That explains it all! Your chickens got to that pop-corn and then went out into this desert sun and it was so hot that the corn popped and popped their heads off.'"



A Coahuilla basket

When the laughter at this had subsided, Tingman told another of an old lady who had promised to bake a cake for a church sociable. Said he: "The old dame came into my store and asked

for some unbleached muslin. I measured it off and gave it to her, when, to my amazement, she began to cut it up into tiny little bits. 'What's that for?' I asked. 'Why are you ruining that fine muslin?' 'Oh!' said the old lady, with a sweet and simple smile, 'I'm making little bags so that I can fill them with cracked ice to tie around my hens' necks!' 'Cracked ice? To tie around your hens' necks?' I cried in perfect astonishment and bewilderment, 'what's that for?'

"'Oh, don't you know,' she replied with a smile that now was 'child-like and bland,' 'that that's the only way to get fresh eggs. If I don't put the ice on, the only eggs I get are hard boiled ones!'"

This led one of the others to tell a story on Tingman, which the latter boisterously declared was "honest truth." Tingman had a burro which was very fond of home, so much so that when he was once sold it was not many days before he came back. The purchaser on his return demanded repayment of the amount he had expended on the burro, but Tingman compromised on half. It happened to be a time of great activity among prospectors and they piled into Indio at a lively rate trying to buy burros. Tingman hit upon a great scheme. He sold the burro with the distinct understanding, signed as an agreement, that if the burro came home he was to retain it. Sixty times — "by actual count" — the burro was sold and — came back. At last a German bought it who was familiar with the burro's "returning home" habit. He vowed the burro should never return on him and for three days and nights he watched, and when he found the crafty animal making a break for home, he deliberately shot and killed it.

Tingman now contemplates erecting a monument to the memory of the burro.

Photo. by Putnam & Valentine, Los Angeles, Cal.

CUTTING ALFALFA ON THE COLORADO DESERT

CHAPTER XXIV

The Reclamation of the Desert, in the Imperial and Coachella Valleys

EACH visitor to the desert has his own ideas as to the possibility or probability of its future reclamation. That all the desert will ever be "reclaimed" I do not believe. There are other utilities in life than those based upon commercial returns. It would be a tremendous pity to reclaim all the desert. We need it for other and better things than growing melons and corn. It is required for the expansion of soul, the enlargement of vision of perhaps only a few men, but those few will help influence and benefit the world. Elijah's retirement to the desert gave him the power that led to the emancipation of his people from a great ecclesiastical tyranny. Mahomet's desert experiences gave the world a new religion. Christ's forty days and nights in the wilderness renewed his spiritual power. The close proximity of the desert to the growing cities of Southern California is one of the greatest of blessings. Though, as yet, unappreciated and largely unknown, it is waiting to pour out of its largeness into the hearts of the few men and women who will ultimately come to learn from it the lessons that will better fit them to lead the people of Southern California to higher and nobler things.

Yet it is good that man seeks to reclaim the desert. All his efforts will benefit him, no matter what their influence may be on the desert itself. The first scientific presentation of the subject in the United States was made by Major J. W. Powell,

the hero of the Colorado canyons explorations, who in 1878 published his "Lands of the Arid Region." With a foresight that was far ahead of his time this wise and good man counseled the government's control of the arid lands, absorption of suitable reservoir sites and erection thereon of adequate reservoirs, conservation of water supply, whether the constant flow of rivers, creeks, or springs, or the torrential downpours of intermittent seasons.

In the Colorado Desert region the first intelligent efforts to this end were made forty years ago by Dr. O. M. Wozencraft of San Bernardino. He was a pioneer who, in crossing the desert, saw its great possibilities, provided it could be irrigated. He was a man of marked personality, far-seeing vision, and lived a generation before his time. He sought to obtain from Congress a grant of land for the carrying out of his plans, which included practically what is now the project, in the main, of the California Development Company. His scheme was looked upon by most of the members of Congress as visionary, and though the experts warmly advocated his plans, the "wise politicians" regarded it more in the light of a joke than as a serious project to be entertained with due consideration and dignity. The result was, the doctor frittered away his fortune in his endeavors and all in vain. Even so able a man as J. Ross Browne had his sarcastic fling at the scheme when he said: "Still I can see no great obstacle to success except the porous nature of the sand. By removing the sand from the desert, success would be insured at once." I invoke his shade to witness what has been done, *without removing the sand*, and I doubt not he is now hanging his head in shame, provided, of course, that shades can hang their heads in shame.

Yet the efforts of Dr. Wozencraft were not in vain. They were a stimulus and incentive to others, and finally his *visionary* scheme was taken hold of and is now on the way to one of the most marvelous of successes.

Twenty years or so ago Dr. Wozencraft's plans were resuscitated by John C. Beatty, who organized the Colorado River Irrigation Company. He engaged as his engineer to make reconnaissances and surveys C. R. Rockwood, then in the em-

ploy of the United States Reclamation Service. Mr. Beatty was a man of large foresight, but not being able to properly finance his plans they fell through, his company became involved in litigation, was ruined, and the entire project abandoned. Mr. Rockwood's surveys were sold under the auctioneer's hammer and bought in by Dr. Hefferman of Los Angeles. Mr. Rockwood, having by his surveys become thoroughly interested in the scheme, now determined to interest capital to promote it.

In 1896 the California Development Company was organized for the purpose of reclaiming what was then called for the first time "The Imperial Valley." This valley reaches from the Mexican line on the south to where the Alamo and New Rivers come near together before emptying into the Salton Sea on the north, and these two rivers practically form the eastern and western boundaries. Approximately 500,000 acres of land are

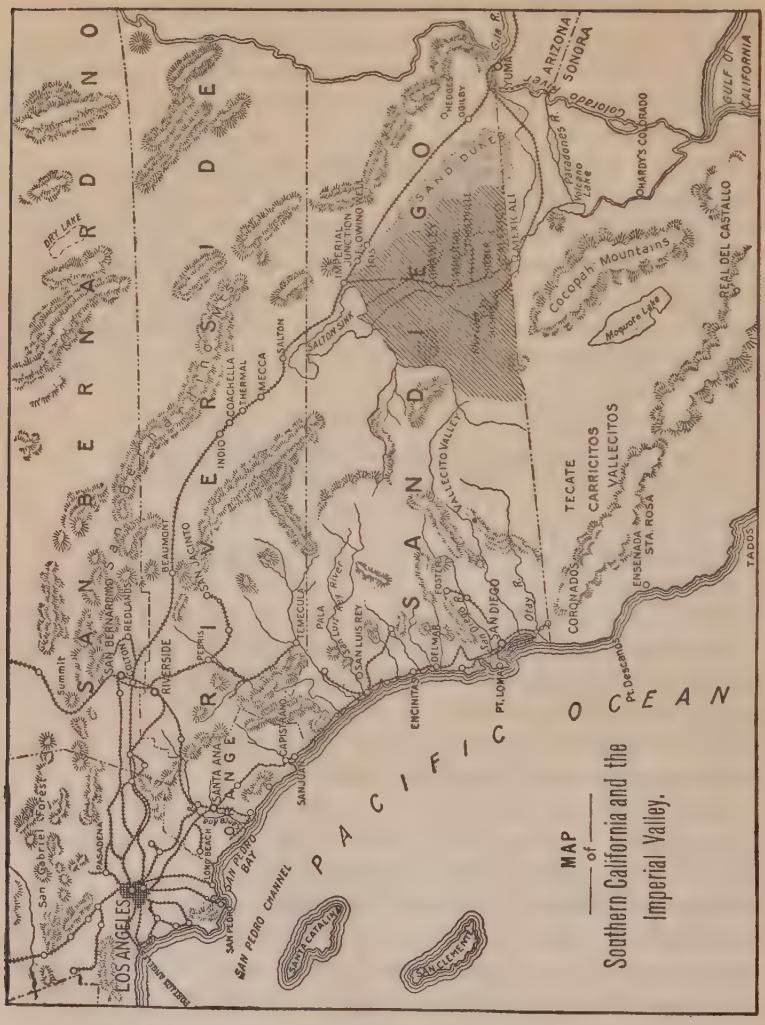
Headquarters of California Development Company, Calexico

included in this region. The Development Company, however, did not own or control any of this land, nor did it seek to do so. It was purely and simply a water corporation, organized for the purpose of bringing water from the Colorado River to the land of the valley, which, being government land, was open to entry and settlement as all other such lands were.

As it was found that the main canals of the company would have to flow for many miles on Mexican soil, a concession was secured from the Mexican government to a branch of the Development Company, generally referred to as the "Mexican Company." The terms of this concession required that a headgate for the taking of water from the Colorado River should be established and maintained in operation on the Mexican side of the line, as well as the one contemplated on the California side.

The company had undertaken a gigantic task. Fortunately, as I have shown elsewhere, Nature in prehistoric times had pre-

pared much of the way in raising the Colorado River, by the uplift of its own sediment, high above the lands that were to be



irrigated, and then, as if in anticipation of this very scheme, had later on cut a river channel in the required direction, which

for some forty or fifty miles could be used as a canal for the conveyance of water to the Imperial lands.

The upper part of this river and the New River could also be utilized for conveying the waste water, seepage, or overflow into the dry bed of the Salton Basin, it not being thought at that time that there would be a larger flow than the rapid evaporation of the desert could care for. All these facts were discovered by Mr. Rockwood in his surveys.

The question then arose before the company: How can we arrange matters so that the settlers in the valley can secure water at once for the development of their land, and at the same time arrange, in time, to own themselves the various canals, head-gates, etc., that compose the irrigation systems on their own lands?

Here is the company's explanation of its method:

"In order to place the ownership of the distributing systems of canals and ditches in the hands of the people who were to use the water, so that they could manage its distribution in their own ways, the system of mutual water companies that has grown up in so satisfactory a manner under the liberal laws of the state of California was adopted.

"A mutual water company is a corporation organized for the purpose of furnishing water to its stockholders only at cost.

"It was not deemed feasible to place 500,000 acres of land under one mutual water company; hence several of these mutual water companies have been formed, each one to supply water to a particular locality, and these localities or districts have been outlined largely by the natural topographical features of the country.

"Eight of these corporations were formed, but only seven of them have been thus far utilized. Each corporation is known by the name of Imperial Water Company and then numbered, as Imperial Water Company No. 1, Imperial Water Company No. 8, etc. Numbers 1, 2, 4, 5, 6, 7, and 8 are live corporations, while No. 3 has been merged into No. 1.

"Each one of these mutual water companies makes a contract with the California Development Company and the Mexican Corporation, under which these corporations are to deliver a supply of water perpetually to the mutual water company at the

fixed price of fifty cents per acre-foot — fifty cents for enough water to cover an acre of land one foot in depth — which is equal to about two cents an inch for a twenty-four hour flow of water — the cheapest water on the Pacific Coast.

"The California Development Company also provides for the construction of the distributing system of canals and ditches for the mutual water company, taking the stock of the mutual water company in payment of such work. This stock is sold to the settlers at the rate of one share of stock for each acre of land to be irrigated. The mutual water company is thus provided with a water supply and a system of canals and ditches free of indebtedness. There is one exception to this rule. Imperial Water Company No. 8 paid for its system of canals and ditches with twenty-year six per cent bonds, and the landowners get their stock for nothing by investing in the bonds of the corporation to the extent of only one dollar per acre, as a matter of showing good faith in taking water stock for which they pay nothing.

"So far as water rights and cost of water are concerned, these mutual water companies are all on the same basis. Imperial Water Company No. 1 was incorporated to irrigate 100,000 acres of land located between New River on the west and the Alamo River on the east, and extending from the International Boundary Line on the south to a short distance north of the town of Imperial on the north. Imperial Water Company No. 4 was formed to irrigate 17,500 acres of land between the two rivers, adjoining No. 1 district on the north. Imperial Water Company No. 5 was incorporated to irrigate 100,000 acres on the east side of the Alamo River, but later it was thought best to confine the work of this company to about 50,000 acres, as it is thought that, as a rule, that area is enough to be placed under one water company. Imperial Water Company No. 6 was formed to irrigate 25,000 acres of land on the west side of New River, near Signal Mountain on the International Boundary Line. Imperial Water Company No. 7 was formed to irrigate 20,000 acres of land next to the International Boundary Line, on the east side of the Alamo River, and south of the Eastside diversion dam. Imperial Water Company No. 8 was formed to irrigate 40,000 acres of land on the west side of New River, in a northwesterly

Main canal, near Imperial

direction from the town of Imperial, and directly west from the town of Brawley, which is located on the Imperial branch of the Southern Pacific Railroad.

"Under the contract for a water supply, these mutual water companies are entitled to receive each year four acre-feet of water for each share of outstanding stock, and are required to pay for at least one acre-foot of water each year for each outstanding share of stock, whether the water is used or not.

Typical ranch-house in Imperial Valley

This clause was inserted in the contract for the purpose of discouraging speculation in the water stock and land, for, if the owner is required to pay fifty cents an acre each year, it will be a very strong inducement for him to improve his land, use more water, and thus build up the country, and not only make his own land more valuable, but to also increase the value of the land belonging to his neighbors.

"The stock of these various mutual water companies — except Imperial Water Company No. 8 — is held at the same price, which in August 1, 1903, was $20 a share, on the following easy terms of payment: Cash, $5.00 a share at the time of purchase and $3.00 per share on the first day of July of each year until the balance is paid, with 6 per cent interest on deferred payments. A discount of 10 per cent is allowed for all cash. This price and these terms are subject to change without notice.

Flume carrying the canal over New River

"Each landowner gets what water he needs at the cost price to the company, plus a small sum to pay cost of distribution and

administration of the affairs of the mutual water company. This last item ought not to exceed 25 cents per acre per year.

"It is believed that alfalfa, which requires more water than any other crop, will not need more than three acre-feet of water to each acre of land each season. This will cost the ranch owner about $1.75 per acre — $1.50 per acre being the fixed price, and 25 cents per acre being the cost of management and distribution.

"For an abundant supply of water at all times this is considered to be the cheapest water to-day in the United States, and it is not believed that works constructed by the government could furnish water at a less cost."

In 1899, William E. Smythe, in his "Conquest of Arid America," thus wrote of the reclaiming of the Colorado Desert: "It is popularly regarded as an empire of hopeless sterilty, the silence of which will never be broken by the voices of men. As the transcontinental traveler views it from his flying train it presents an aspect indeed forbidding. Neither animal life nor human habitation breaks its level monotony. It stretches from mountain range to mountain range, a brown waste of dry and barren soil. And yet it only awaits the touch of water and of labor to awaken it into opulent life. Much time will be required to overcome the wide and ingrained public prejudice against the Colorado Desert, but it will finally be reclaimed and sustain *tens of thousands* of prosperous people. It is more like Syria than any other part of the United States, and the daring imagination may readily conceive that here a new Damascus will arise more beautiful than the old."

As early as 1853, Professor Blake wrote that "there can be no question of the fertility of this region, and of the clay soil of the desert, at any point where water can be obtained in sufficient quantity for irrigation."

See then the water being provided. Early in 1900 not a stroke of work had been done by the California Development Company owing to the lack of finances. Even then it began work with assurance of but a small portion that would be required to complete the system. It was March, 1902, before water was turned into the main canal for irrigation, and yet in September, 1904, the company had constructed and were operating over 700 miles

of canals and ditches and had brought into the Imperial Valley about 8,000 settlers, and had in crop nearly 75,000 acres.

The fertility of the soil was at first somewhat questioned by government "experts" sent out to make tests. The department made a mistake in sending young and inexperienced men to do this work, for in less than a year their "official" prognostications were discredited by the actual growths of crops in places where they had practically prophesied failure.

I now speak of that which I have personally seen. Alfalfa grows six to eight crops a year, yielding from one to two tons of cured hay per acre at each cutting. Wheat and barley at first did

An imported Galloway bull on the desert

not do very well. The farmers did not fully understand the new conditions. The second year, however, showed such capacities that I know of one farmer who, alone, in the third year and ever since, has planted not less than 2,000 acres of barley. Milo maize, sorghum, Kaffir corn, and millet are fine forage crops, and it is no uncommon thing to plant barley in the winter and, after harvesting, put in these as a summer crop.

Score of tons of cantaloupes, melons, sweet potatoes, and onions were grown this year, 1906, and they equal in richness and flavor those of any location on the continent. Sweet potatoes especially do well, on account of the possibility of allowing them to remain in the ground until winter, when crops elsewhere are scarce.

Small fruits, such as seedless sultanas, grapes, dewberries, blackberries, etc., ripen much earlier here than even in the favored climate of the coast regions of Southern California and find a ready market at good prices.

Experiments are being made with the date, as at Mecca, and there is little doubt but that the results will prove successful. Sugar-beets, rice, and early vegetables also do well. Indeed the scope for the farmer and horticulturalist is large, and as the conditions improve with the continued planting of trees it will not be many years, in my judgment, before the population of this and similar desert regions will be as dense as it now is in many of the older eastern regions.

With alfalfa, barley, wheat, and other forage it can well be seen that the Imperial country is excellent for stock and cattle

Cattle in the Imperial Valley

raising. Hogs do as well as cattle, and there is in Los Angeles a market for ten times as much live stock as is now being raised.

In this short period of time the Southern Pacific has built upwards of sixty miles of railway into the valley, and the Holtville Interurban runs an electric line from Holtville to Imperial, a distance of twelve miles.

The freight reports of the Southern Pacific for 1905, the third year after work *began* in the valley, as shown on the following page, is the best indication of its growth.

The towns of Imperial, Brawley, Holtville, Heber, Calexico, Mexicali, Silsbee, and El Centro have been established, with hotels, banks, newspapers, good stores, schoolhouses, telephones, ice plants, piped-water systems, and electric lights.

Since the flooding of the Salton Basin, as elsewhere related, there has been a decided arresting of the course of development.

This was natural. In the chapter on the Salton Sea I record the efforts that have been made and are now, (October, 1906,) being made to arrest the flow. When that is accomplished the growth of the valley will flow on uninjured and a great empire will be built up on what was once the Colorado Desert.

STATEMENT OF TONNAGE MOVING OFF THE IMPERIAL BRANCH OF THE SOUTHERN PACIFIC RAILWAY TO IMPERIAL JUNCTION AND IMPERIAL DURING YEAR 1905.

DESCRIPTION OF COMMODITIES.	FROM							TOTAL TONS SHIPPED OF EACH COMMODITY.
	BERNICE.	BRAWLEY.	KEYSTONE	IMPERIAL.	EL CENTRO.	HEBER	CALEXICO.	
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	
Wheat	. .	178	. .	191	. .	. .	. .	369
Corn	. .	492	. .	32	. .	. .	. .	524
Oats	. .	. .	. .	9	. .	. .	. .	9
Barley	95	1918	53	3228	143	1843	503	7783
Other Grain	. .	24	. .	. .	. .	. .	. .	24
Feed	. .	. .	. .	122	. .	. .	35	157
Hay	. .	263	10	774	9	125	. .	1181
Green Fruit	. .	. .	. .	. .	. .	. .	20	20
Vegetables	. .	36	. .	. .	. .	. .	. .	36
Melons	. .	132	. .	. .	. .	. .	. .	132
Horses	. .	. .	. .	100	. .	. .	20	120
Cattle	24	. .	. .	1730	. .	. .	603	2357
Sheep	. .	. .	. .	24	. .	. .	. .	24
Hogs	24	116	. .	835	. .	24	161	1160
Machinery	. .	18	. .	20	. .	. .	. .	38
Ag'l Implements	. .	30	. .	. .	. .	. .	. .	30
Emigrant Mov's	. .	10	. .	100	. .	. .	. .	110
Ice	. .	15	. .	. .	. .	. .	. .	15
Outfits	. .	24	. .	. .	. .	. .	24	48
Total Tons Shipments from each place	143	3256	63	7165	152	1992	1366	

Of no lesser importance, though smaller in extent, are the irrigation enterprises of the Coachella Valley at the northwestern

Photo. by Putnam & Valentine, Los Angeles, Cal.

WATERMELONS GROWING AT COACHELLA ON THE COLORADO DESERT

end of the Colorado Desert. Here, however, the water is supplied by artesian wells, the existence of which is explained in the chapter on "Water on the Desert." The towns of Indio, Coachella, Thermal, and Mecca are the business centers of these rich and fertile desert-lands. There are in all about two hundred thirty-four square miles in this valley which are irrigable from the present supply of artesian and surface wells. The valley extends from a little above Indio to the badly alkaline lands of the Salton Sink, which forms the southeastern boundary, the mountains on the northeast and southwest naturally limiting the soil areas in their direction.

Of the climate in both the Imperial and Coachella Valleys I have not written specifically, but it can well be inferred from the general presentation of the subject found throughout these pages.

On the main canal, Imperial, wagon road

Semi-tropic and arid, it is characterized by cloudless skies, low relative humidity, high temperature in summer, and slight frosts in winter. The summers are long and very hot, but owing to the dryness of the atmosphere the high temperature is not nearly so oppressive as temperatures of twenty or twenty-five degrees lower in the humid part of the country.

Most of the land of the valley is level, with a general slope from six to twenty feet to the mile, so that it is well suited to irrigation, though in the western part, in the vicinity of Indio, there are many sand-dunes, to level which would exceed the value of the land. Along the base of the mountains the soil is sandy and gravelly, and it is cut, here and there, by small arroyos which extend from the canyons of the mountains and carry water during flood time. At the mouth of each of these arroyos is a

cone delta, and these give to the surface an irregularity which will add difficulties to the engineering features of its irrigation. The flood waters, too, require to be provided for, so that crops growing during the period when floods may occur be not destroyed.

The surface soil of the whole valley is practically composed of wash from the mountains, though undoubtedly there is some of the sedimentary deposit of the old lake. It is divided into five separate types, viz., Fresno sand and dune sand, Fresno fine sandy loam, Fresno sandy loam and Imperial clay. The two first named are alike in character, but the first lies in comparatively flat areas, while the dune sand, as its name implies, is largely in low, broad, crescent-shaped dunes from two to twelve feet in height. The fine, uniform particles of finely pulverized mineral matter that go to make up the Fresno fine sandy loam render it the most valued and valuable land of the valley.

At present the whole of the irrigation of the Coachella Valley is from wells, mainly artesian, some of which flow and others need to be pumped.

The amount of water a well will flow varies greatly with its location. Near Mecca and as far up as Coachella the flow from a three-inch well is generally enough to irrigate forty acres of land. Some wells flow much more water than others, and some crops require more water than others.

There is a sensible diminution of the flow from artesian wells in the valley, as more wells have been bored. This is especially noticeable in the vicinity of Indio. Where three years ago wells flowed several inches over the casing they now have to be pumped. The supply will surely be further diminished as more wells are put in on the lower levels, and for much of the country now irrigated from flowing wells pumping will be necessary. This has been the history of all artesian districts; the wells at higher levels always cease to flow and have to be pumped as their supply is lessened by wells being bored at lower levels.

It has recently been noted near Coachella that not one of the wells sunk to a depth of 600 feet will flow when all the pumps are running, but those down 1,000 feet will flow all the time. The price of a good pumping plant ranges from $1,000 to $2,000, which includes the sinking of the well, pipe, etc.

Bare land is held at prices ranging from sixty dollars to one hundred and twenty dollars an acre, one hundred dollars per acre being a fair average.

The chief crop of the Coachella Valley is cantaloupes. From an experienced horticulturalist, speaking through the *Rural Californian* early in July, 1906, we learn that "between 700 and 800 acres will be planted to cantaloupes next season, and about two hundred fifty acres to melons. The approximate yield is two hundred crates of cantaloupes to the acre, and the average price to the grower last year was one dollar twenty-nine cents a crate. Melons will yield about eight tons to the acre, returning to the grower an average of twenty dollars a ton throughout the season. Two and a half acres of cucumbers netted $1,100; tomatoes during the month of June sold for ten cents a pound; and string beans, of which there are large quantities raised, brought from six to seven cents a pound."

Besides the products above referred to large quantities of Thompson's seedless grapes find a ready market at good prices. The Malaga grape, too, produces abundantly in Coachella, and the prospects are that ten car-loads or over of both kinds will be shipped next season. About 500 acres will be planted to grapes this year, but even if 5,000 acres were planted there would be no danger of over-production. Grapes ripen in that section fully six weeks earlier than they do in other portions of California, hence competition is reduced to a minimum.

It has been found, however, that where land is used continuously for melons and cantaloupes the value of the crops decreases each year. Careful and scientific farmers, therefore, not only diversify their crops but have learned, or are learning, the practical utility of planting the leguminous crops which have the power of producing nitrogen from the atmosphere. These crops are sometimes "turned under," without harvesting, in order that all the nutriment may go to enrich the soil. The result is a large increase in the value of the land.

As growth is practically continuous owing to the perpetual summer climate and the use of irrigation, a little care and forethought will produce crops throughout the year, and due rotation of crops will preserve the richness of the soil.

This year (1906), however, the cantaloupe crop of the Coachella Valley suffered largely from the aphis, a small insect that injures the growing vine. But methods are being tested which prove that the aphis can be killed so that it is pretty well assured the evil of the pest can be overcome. This presence of the aphis is the first appearance, I believe, of an insect pest upon the fruit or vegetables of the desert. As a general rule it may be stated that the desert is free from these pests. The black scale on the orange, the red scale on the lemon, the red spider on the grape, are unknown, and to one like myself, used to seeing these pests and having to

Irrigation in Imperial Valley

wage constant war with them in the coast regions of Southern California, the freedom from them on the desert has always been a source of delight.

The cantaloupe crop of the Coachella Valley is mainly handled by a "Producers' Association." This association supplies the seed, and gives to its members expert instruction as to the methods of farming which produce the best results. When the crop ripens the members deliver their produce to one or other of the four shipping points of the association, where it is duly packed, and shipped in refrigeration cars, iced from the association's own

plant. The produce is thus pooled and the grower receives his return from the net profit of the pool. Crops are shipped to Chicago, New York, Boston, Philadelphia, Pittsburg, Omaha, Kansas City, Denver, San Francisco, Portland, Ore., Butte, Seattle, Spokane, and Salt Lake City.

The table on page 371 cannot fail to be both interesting and instructive.

From this table it will be seen that the net proceeds to the grower for his cantaloupes ranged from eighty-eight cents, when the largest shipments were made, to $3.75, which was the first and smallest, when, of course, prices obtained were high.

I think, therefore, it is apparent that the fertility of the soil, the almost absolute control of crops by irrigation, the close proximity to a great system of railway that insures speedy and economical distribution of crops and reception of supplies, and above all, the fact that crops ripen weeks earlier than elsewhere throughout the country, and that the rapid growth of the cities of Southern California provides a market for all that can be grown, at good prices, are clear indications that the fertile valleys of the Colorado Desert have an assured future of great prosperity before them. And when to these is added the anticipation of larger markets that will necessarily open when the Panama Canal is completed, by the greater influx of shipping, and the constant and marvelously rapid development of all that goes to increase population in Southern California, it can well be seen that the prospects of the desert farmer are bound to be enhanced in value. To me the development of these fertile areas, from once apparently valueless lands, is one of the most interesting phases of desert life, and I shall continue to watch it with keen interest.

Before concluding this chapter a few words must be said upon the subject of irrigation. This is not a mere matter of letting water run haphazard on the ground. In these desert regions, where water is scarce and evaporation rapid, great care and wisdom must be exercised in irrigation. If water is allowed to run hurriedly over an area, and then cultivation is either entirely neglected or insufficiently performed, more harm than good is liable to result to the trees it was intended to benefit. For, by the hurrying of the water, deep absorption is prevented and only the

surface roots are nourished, and, by the careless cultivation, immediate evaporation not only of the surface takes place, but by capillary attraction the little water that has gone below the soil is drawn back to the surface and evaporates. An additional evil also occurs, in that shallow wetting of the soil leads to the development of tree and plant roots near the surface where they come into more immediate contact with the destructive alkali salts.

One of the difficulties that farmers familiar with Eastern methods meet with when irrigating these desert soils is the "coming up" or "rising" of alkali. Alkali, as is generally known, is the term applied to potash, soda, or lithia when found in soils in large and clearly discernible quantities. Here is the average composition of alkalies from the Colorado Desert:

Calcium sulphate ($Ca\ SO_4$)	9.91%
Magnesium sulphate ($Mg\ SO_4$)	9.02%
Sodium sulphate ($Na_2\ SO_4$)	.33%
Potassium chloride (KCl)	30.02%
Sodium bicarbonate ($Na\ HC\ O_3$)	9.59%
Sodium nitrate ($Na\ No_3$)	8.91%
Sodium chloride ($Na\ Cl$)	32.22%

All the soils of the lower levels of the desert contain alkali, some more, some less. While some plants and trees can resist a large quantity of alkali in the soils, others are most sensitive.

Experience has demonstrated that the best way to treat heavily alkaline soils is to flood the affected area so that the salts are backed down into the lower soil, and then deeply and thoroughly cultivate the ground to prevent surface evaporation and the consequent return of the alkali.

Subsoil irrigation is sometimes practised where the supply of water is small. This method possesses the merit of compelling the water to penetrate quickly and deeply into the soil, leading to a deeper establishment of root-systems and allowing less surface evaporation. But even in such cases surface flooding should be resorted to as soon as a sufficiency of water is had for the purpose.

Table Showing Distribution to Growers in Weekly Pools

CANTALOUPES — EASTERN POOL

Pool.	Total No. Crates.	Net Proceeds.	Average.	STANDARD CRATES. No.	STANDARD CRATES. Net Proceeds.	STANDARD CRATES. Average.	PONY CRATES. No.	PONY CRATES. Net Proceeds.	PONY CRATES. Average.
Special Pool	41	$110.85	$2.70				3	$ 11.25	$3.75
Pool No. 1	630	983.18	1.56	81	$ 209.19	$2.58	140	234.61	1.67
" " 2	3,792	5,451.43	1.44	599	1,799.09	3.00	857	1,705.96	1.99
" " 3	13,649	17,144.93	1.26	5,427	8,489.09	1.56	4,232	5,178.93	1.22
" " 4	27,037	23,901.96	.88	9,986	11,175.34	1.12	9,109	8,032.09	.88
" " 5	20,019	31,519.23	1.57	7,638	17,530.32	2.30	5,533	8,365.58	1.51
" " 6	8,153	16,254.14	1.99	2,490	7,408.52	2.98	3,124	5,600.12	1.79
" " 7	2,068	3,665.12	1.77	676	1,764.15	2.61	795	1,212.27	1.52
" " 8	1,424	2,488.55	1.75	555	1,331.59	2.40	636	858.39	1.35
" " 9	178	310.20	1.74	64	150.62	2.35	83	108.62	1.31
	76,991	$101,829.59	$1.32	27,516	$49,857.91	$1.81	24,512	$31,307.82	$1.28

Hidden Lake, on the edge of a mountain ridge on the trail to San Jacinto Peak

CHAPTER XXV

Horticultural Possibilities of the Desert

S early as 1857, Dr. Veatch called attention to the fertile character of the desert soil. He contended that only those parts of the desert were condemned to irretrievable barrenness that were covered with drifting sands. The other portions only needed moisture to produce a wilderness of vegetation. He suggested the use of New River, "but a far more convenient supply could be furnished by artesian wells, or, better still, by windmills raising water from common wells."

Dr. Newbury, of the Colorado River Exploring Expedition, also said: "If water could be supplied regularly to the New River country it would be a perfect garden."

A large portion of the soil of the desert is the siltage of the sediment brought down ages ago by the Colorado River. It is hundreds of feet deep in places, and as rich and fertile a soil as can be found in the world. Like the sedimentary soil of the Nile overflowed region it is of the highest possible nutritive value, and in such proportions that the accretions of years only make it the richer. Occasionally there is a layer of harder clay, but generally speaking the soil is of this rich, soft, sedimentary nature.

One finds out how soft the soil is if he accidentally treads upon it after irrigating. Down he goes in a moment into a mushy quicksand that covers him over the shoe tops in a moment, and if the seepage has been deep and he stands there the surprised stranger will sink to his knees in a very few moments.

With such soil and careful irrigation the possibilities of the desert seem almost endless.

I think it may safely be accepted as a constant rule, that in proportion to the variety of trees and plants naturally produced

on the desert, within equal areas, will be the variety of agricultural products and their relative success. Yet great care must be exercised by those not familiar with desert conditions or they will assuredly plant trees that are doomed to failure. Many a sad story might be written of men, too confident in their own knowledge, or too ignorant to know what they were doing, who lost their all in planting things unsuited to meet desert conditions.

Oranges grow wonderfully at Palm Springs, and also on the mesa heights above Yuma. At the former place the fruit is very juicy and heavy and contains more saccharine matter than is found in any of the oranges grown elsewhere in the state, and, ripening so much earlier, it commands a high price. It is a great delight, too, to see the trees and fruit free from scale and all parasites. The leaves are green and clean, with a richness that delights the eye and tempts one to touch and caress them; and the fruit in its golden yellow, free from all black discolorations, gives the lighter note of color that completes the beauty of the picture. I suppose that only those who have seen the oranges growing in the moister air near the coast, where the black scale discolors leaves and fruit as if soot had fallen upon them, and where the dust of the roads settles upon them and deprives them of their fresh and beautiful appearance, can fully appreciate the charm and delight of these clean, fresh, healthful trees at Palm Springs.

Signal Mountain and New River

Figs grow luxuriantly, the mission variety so far being found to be the only commercial success. I have told of Fig Tree John's wealth in his fig trees, and at Palm Springs, Marcos, the Indian, received $30 for the product of three trees last year. The mission fig is the same variety as that known as the Brown Turkey. It is rich, sweet, and juicy, and singularly free from seeds.

Photo. by Putnam & Valentine, Los Angeles, Cal.

GRAPE-VINES GROWING AT COACHELLA, ON THE COLORADO DESERT

The pomegranate (*Punica granatum*) grows luxuriantly on the desert, and can be increased illimitably by cuttings, layers, and suckers. It ripens in the beginning of July and is rapidly becoming a profitable market fruit.

Cantaloupes, as I have already shown, are the chief present crop of the Coachella Valley. This fruit is so called from a country-seat of the Pope, near Rome, where it has long been cultivated. It was originally a desert plant, for it was taken to Rome from the Armenian desert. In 1904 cantaloupes ripened

Dr. Murray's orange grove at Palm Springs

at Coachella May 20, and shipments were made at that time. The first three crates sold for $50, and six crates the following day brought $72 in Chicago. Of course these are the fancy prices for early fruit.

Three years ago Goth Brothers, of Coachella, planted a small patch of sweet potatoes, and so large were their profits that the next year they materially increased their acreage. Last year they had a great demand for sweet potato plants locally, and this year they have commanded orders from all parts of the state. Up to date they have filled orders for 206,000 plants, and have

orders in for 80,000 more, which are being filled at the present time.

They began shipping these plants on March 26. The plants could have been shipped at any time during the winter, as they throve all through that season, but the fact is that no other section had warmed up sufficiently, until March 26, to justify the setting out of the plants. They sell the plants at two dollars per thousand. This is "easy money" surely, since the plants sprout from the potatoes left in the ground after the field has been plowed up and the crop marketed.

Head of milo maize

On the twenty-eighth of June they began the shipment of potatoes. Their crop was sent to Colorado Springs, every potato carefully wrapped in tissue paper and sold for thirty cents a pound. The clubs and epicures of many cities took the crop as fast as it could be supplied for eighteen days at thirty cents, when prices dropped. When they were quoted at one and one-half cents on September 25, the Goth Brothers again stopped shipping and again held them, as they lay in the ground all winter.

Milo maize

All other supplies of sweet potatoes having again become exhausted, they resumed shipping on February 27, 1904, when the price had advanced to two and three-fourths cents per pound, and have been shipping ever since, the price gradually rising, and now being sold at four cents, with higher prices in sight, as is usual in the spring and early summer. A peculiarity that favors the sweet potato grower in the Coachella Valley is that the soil has a preservative quality that is distinctive. It is only necessary to keep the irri-

gation water off the sweet potato field in order to hold them in the ground, just as they lay, without blemish, all winter.

The Bermuda onion is also found to grow remarkably well. It yields heavily and sells readily at a good price. Another advantage it possesses is that it will keep.

A car of tomatoes, cabbage, or other similar vegetable, shipped North, must, on account of its perishable nature, be sold as soon as it reaches the city and placed in the consumers' hands. And for this reason the glutting of the markets and the consequent low prices are inevitable. In the case of a car of Bermuda onions there is no such necessity, for the onions can be delivered to the most distant parts of the United States or Canada, or sold for export, and be kept in stock by the dealers as a staple article, which will absolutely prevent the demoralization of prices and consequent loss to the producer.

Sugar cane growing in Imperial Valley

There is a great possibility that rice will become one of the paying crops of the Imperial Valley and Colorado River region. It needs a warm country and also plenty of water, for it must be flooded for seventy days,—from the time the plants are from six to ten inches high until the grain is in the milk. Both conditions can be met on the desert, and there is no reason that this should not become a regular crop.

Alfalfa is by many regarded as the "queen of desert forage plants." It will grow in a greater variety of soils, is hardier, will resist more alkali, is richer in nutritive qualities than clover, yields heavier tonnage, is less trouble to grow, enriches the soil for future and different crops by gathering nitrogen from the atmosphere, and gathers useful mineral elements from the deeper layers of soil. It is thus a great renovator of the soil.

What may be accomplished in a short time under good conditions on the desert is being demonstrated by Mr. Fred N.

Johnson, whose place is about a mile and a half west of Indio. Mr. Johnson is a young man, driven by ill health from Illinois to Colorado, where, for several years, he was engaged in the growing of small fruits. He then moved to Southern California and finally upon the desert, taking up, under the homestead act, one hundred sixty acres of land. A little over three years ago he began the active cultivation of his place, or rather a small portion of it, having a firm belief that it is far better to work a few acres well than a large number indifferently. He has about six and a half acres already planted, and to one unfamiliar with the rapid growth of plant life in this natural forcing-house the results he has attained seem little less than marvelous.

With a clear perception of what he desired to attain he planted accordingly. He decided that, as fruits grown on the desert

On the main canal, Imperial Valley

mature so much earlier than those grown elsewhere, he would endeavor to secure a succession of crops for the home markets of Riverside, Redlands, Los Angeles, and San Francisco. It is well understood that fruits and vegetables which appear in the markets a few weeks ahead of the regular seasons command high prices, especially if these early products are of fine appearance and equally fine quality. Here then were objects to be attained. The soil of his ranch is, in the main, a sedimentary deposit almost as light as ashes, which works easily, does not "bake" after irrigation and yet retains the moisture. For irrigation he drove three wells, each in the neighborhood of one hundred and six feet deep, equipping them with self-acting windmill pumps.

For an early crop he planted twelve short rows of asparagus, —

less than an acre. On the second year it came into bearing and this year and last he began to ship as early as February 15. He found, however, that his shipments were no earlier than the asparagus grown on the San Joaquin River reclaimed lands in the central part of the state. Still there was a good market for all he could send. For about two months he continued to ship, and at the end of the season he found his net returns from the twelve rows were sixty-five dollars. The vegetable sold in the market for about ten cents a pound, from which deductions must be made for crating, commission, and expressage, leaving the net price gained about seven and a half cents per pound.

As soon as the crop of dewberries, raspberries, and strawberries began to ripen, the asparagus was neglected and all possible attention given to the newer crop. From eight short rows (seventy-five to one hundred feet long) one hundred seventeen crates of dewberries were shipped and sold (besides seventy quarts put up for home consumption). These sold for from one dollar fifteen cents to one dollar fifty cents a crate and netted the grower about seven cents a basket, or one dollar a crate, making a total of one hundred seventeen dollars for the season. In addition new plants were grown from the beds and twenty-seven dollars' worth sold, making the total proceeds from dewberries one hundred forty-four dollars. There is an unlimited demand for this kind of fruit and the desert is by far the best place to grow it.

One of the lateral canals, Imperial Valley

Then figs and grapes come into bearing about the same time, viz., June 15. The early figs bring one dollar and fifty cents for an eight-pound crate, which contains six and one-half pounds of figs. From eight trees, only three of which bore well, Mr. Johnson received forty-two dollars last year, and it must be remembered his trees were but two years old. When I saw

them this year (June, 1906) they were trees as large as mine which have been planted over ten years. The fig crop lasts practically until December.

From eighteen apricot trees he picked sixty-two crates and received therefrom fifty-eight dollars net.

He has planted a variety of grapes and is giving them a thorough test. The Thompson seedless is fast coming into favor as a table grape. Though small it is of good flavor, and being seedless is pleasanter to eat. It is a great bearer, though it does not bring as large a price as other more showy grapes. The Luglienga is

A drop in the main canal

an amber-colored grape that ripens earlier than the Thompson seedless. It bears well and is a larger grape. The Chassalas Rose is a finely flavored grape that ripens early. It is not a rank grower, however. The grapes are medium sized and the bunches rather small. On these accounts it is a favorite with the better class of purchasers, and its handsome appearance is an added factor in its favor.

Thousands of grapes of different varieties have been planted in the Coachella Valley this year, but Mr. Johnson's method is one of careful experimentation ere he plants large quantities.

Besides the fruit, Mr. Johnson plants Bermuda onions, from a small patch of which he took over two hundred sacks. Lettuce

he has all through the winter and Lima beans early in the fall. The first shipments of these bring in fifteen cents a pound. In addition he has summer squash, egg plants, chili, cauliflower, cabbage, tomatoes, and sweet potatoes, and all do well.

In August the almonds begin to ripen, and as these grow to be very large he obtains twenty cents a pound for them.

One part of his one hundred and sixty acres is of sand-dunes similar to those in the Sahara. He has determined to experiment in date-planting in the dunes exactly as they do in the original home of the date, and for that purpose the government has sent him nineteen varieties of Algerian and Tunisian dates, two Egyptian, and two Persian. The results of his experiments are awaited with interest, because it is assured that all that can be done he will do.

Altogether the possibilities for horticulture in the desert are large, and he is wise who, entering upon this new field, keeps in touch with the experimenters and then follows the results that are successful.

California Development Company's barn and water tower at Calexico, California

Photo. by Putnam & Valentine, Los Angeles, Cal.

ORCHARD ON THE COLORADO DESERT

CHAPTER XXVI

Date-Palm Culture on the Desert

HO is there that does not enjoy the delicious and luscious date? Its rich and meaty sweetness is grateful to young and old alike. The United States imports large quantities each year from Asia, the Year-book of Agriculture stating that in 1901 our imports amounted to 18,434,917 pounds, valued at $372,400. But it must be remembered that this valuation was the price at the port of export, viz., 2.02 cents per pound. The purchaser usually pays not less than ten to even fifteen and twenty cents, the higher prices being for the best varieties.

The major portion of these imported dates come from Bassorah and Maskat, the former on the Shat-el-Arab River, at the head of the Persian Gulf, and the latter in Arabia. Yet all travelers and connoisseurs in dates well know that the supply sent to the United States is of the poorer qualities, and that very few of the richer and more delicious varieties ever reach our tables. This is not as it should be, and it is not in accordance with our national dignity. Yet a few years ago American orders for over a quarter of a million pounds of the finer varieties were refused by Algerian growers because the European demand far exceeds the supply. We need dates for our tables as food, and for confectionery as luxuries. We are willing to pay a good price for them, and if we cannot secure them in one way we will in another.

It was not deemed possible to grow dates in the United States until a few years ago, when the matter began to be more than mere casual haphazard guesswork. An office was organized in the Department of Agriculture to make detailed studies as to the climatic, soil and cultural requirements of new crop-plants,

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San Jose, Calif.

and to determine where they could be grown most successfully. The date was one of the first to receive careful and thorough attention. A comparison of temperatures was found to reveal that in the Salton Basin on the Colorado Desert of Southern California there is a climate which in some respects out-Saharaed Sahara. Parts of Arizona were also found to be very similar in climate to the home of the date.

Accordingly an expedition was fitted out to go to Persia, Algeria, Arabia, Egypt, Tunis, and other date-growing countries, not only for the purpose of studying the various methods of date growing, but also to secure for experimental planting in the United States a variety of the best and richest kinds.

Palms in the foot-hills near Indio

The investigations were most carefully and thoroughly carried on by experts and a large amount of both scientific and practical knowledge obtained. It was found that the date best suited for testing purposes, as well as for practical growing after the experimental stage had passed, was the famous Deglet Noor from the Algerian Sahara. Its fruit is of fairly large size, dark amber colored, translucent and with a small, pointed pit. The flesh is firm, sweet, and of exquisite flavor and aroma. When properly handled in gathering and packing it remains clean, has a fine smooth skin, is unbroken and dry, and can be served as a dessert fruit with most appetizing results, entirely different from the sticky, dirty-looking, mashed-up masses that come from the Persian Gulf region.

There are, however, three kinds of dates of which we ought to have a sufficiency grown in the limits of our own country. There are, in addition to the Deglet Noor and kindred varieties, which are the only kinds popularly known in America, and called by the trade "soft dates," two other types, viz., the "fresh"

and the "dry" dates. Fresh dates contain far less sugar than soft dates and consequently readily ferment and turn sour. But if eaten when fresh, as one eats grapes, they make a most delicious table fruit. Dry dates are harder and more solid than soft dates, drying and hardening on the palms and dropping off as they harden. When gathered they may be kept for years if placed where they are dry and safe from weevils. Dry dates do not taste at all like ordinary dates, as they are not nearly as sweet and have besides a nutty flavor.

All these kinds can be grown in the United States. This has been satisfactorily demonstrated, I believe. Soft dates have been successfully cultivated and gathered both at Tempe, Arizona, and at Salton. Only the other day I had the pleasure of seeing bunches of dates which in the fall of the year will no doubt weigh two hundred or more pounds and be as ripe and delicious as any that are ordinarily imported. As far back as 1895 dry dates were grown in the Coachella Valley. The fruits were about one and a quarter to one and a half inches long and five-eighths of an inch wide, of brownish amber color, much wrinkled and with a dull meal-bloom on the surface. The flesh was hard, but free from fiber and of fine flavor.

Had our scientists been alert years ago they might have discovered a century since that dates could be grown in the Colorado Desert. In Palm Canyon, Murray, Andreas, and Lukens Canyons at the northwestern edge of the desert, various spots on the southwestern edge, and in many places northeast of Indio the fan-palm (*Neowashingtonia filifera*) abounds.

When in the early spring one rides over the desert and comes suddenly upon one of these groves, especially if he be piloted skilfully so that the sand-dunes hide the waving palms until a sudden turn brings them to view in all their weird, wild beauty, they seem to leap upon him with a strange and uncanny feeling. The blue of the sky, the green of the palms, the golden sands, all combine to impress one with a crude intensity, a blazing splendor that is as startling as it is amazing and overwhelming.

These palms are the chief feature of attraction in Palm Canyon, and many visitors each year drive up to enjoy them in their original habitat.

Whence came these palms?

Much has been guessed about them, as that the Spanish padres brought the seeds from Mexico and planted them here. The absurdity of this is apparent when one sees the fruit of these desert palms. They cannot be called dates, these small berries no larger than coffee beans. Though the Indians pound them up into a meal and eat them, the meager flesh would never have justified the padres in going to the trouble of planting them. These priests were too well versed in horticulture to bring seeds that were useless, and after all it is largely conjecture and Indian tradition that they ever saw the recesses of Palm Canyon, though they are known to have camped at Palm Springs.

All that remains of Seven Palms

Be this as it may, modern scientific research has now determined that this is a separate and distinct species. All the fan-palms, with the peculiar threads which the edges of the fronds of these palms carry, found throughout California and the rest of the United States, have come from this desert area, for they are found only in this one locality throughout the world.

The Indians used to have most interesting ceremonies in connection with these palms. They tell me that it was their ancient custom each year to set fire to the dead leaves. This rendered the fruit of the palm larger and sweeter. It must be confessed that it would have to be fired many times a year to make the fruit large and sweet enough for white men to care to gather and eat. The present fruit is very small and with a seed that occupies nearly all its bulk, leaving only a very narrow covering of

"meat." It is sweet and nutritious, however, and the Indians find it a pleasant and helpful addition to their limited natural dietary.

The Arabs have a proverb that the palm to do well should have its feet in water and its head in the fire. In the Colorado Desert these conditions can be pretty nearly fulfilled. The temperature is very high in summer, reaching to 120° Fahrenheit quite often, and it is not unseldom found as high as 130° Fahrenheit. In a comparison with Sahara temperatures, the Salton Basin is found more favorable for maturing the fruit than the former. Hence the positive statement of the government expert, Mr. Walter T. Swingle: "There can be no doubt that the Deglet Noor date

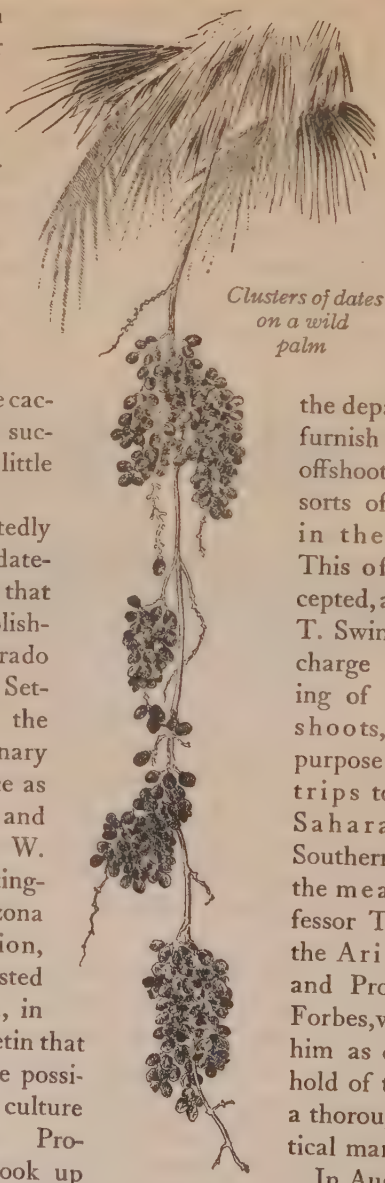
Twenty-nine Palms

will ripen fully in the Salton Basin, even when the season is exceptionally cool. The importance of this demonstration can scarcely be overestimated, since it renders it possible to establish in America the culture of this choice date, the most expensive of dried fruits, with certainty of success."

I have recently paid several visits to the Mecca experimental farm. This farm is not far from the northwest end of the still-rising Salton Sea. The farmer in charge, Mr. Bernard G. Johnson, is of the impression that should the sea continue it might affect the favorable conditions for date growing.

But of this I think there need be little fear. The date-palm is a typical desert growth, and in its native habitat is found ranging from 23° to 35° north latitude. It is possible that the earlier and hardier varieties would grow as far north in California as Mount Shasta. In Arabia and the African Sahara they are

the chief growth of the oases, for they need hot and dry atmosphere, but a sufficiency of moisture at their roots. From this it will be seen that, while a desert growth, the palm is entirely different from the cactus, which grows successfully with but little water.



Clusters of dates on a wild palm

It was undoubtedly the success of the date-palm in Arizona that led to the establishment of the Colorado Desert Station. Settlers first planted the seeds of the ordinary dates of commerce as an experiment, and Professor James W. Toumey, while acting-director of the Arizona Experiment Station, became so interested that he published, in June, 1898, a bulletin that clearly showed the possibilites of the date culture in that region. Professor Toumey took up negotiations with the Department of Agriculture, offering to secure a site for a special date garden — set out, irrigate, cultivate, and generally care for the plants — if the department would furnish a collection of offshoots of the best sorts of dates grown in the Old World. This offer was accepted, and Mr. Walter T. Swingle was given charge of the securing of the date offshoots, for which purpose he made two trips to oases in the Sahara Desert in Southern Algiers. In the meantime, Professor Toumey left the Arizona Station and Professor R. H. Forbes, who succeeded him as director, took hold of the subject in a thorough and practical manner.

In August, 1899, the first small trial impor-

tation of plants took place, but owing largely to faulty methods of packing then in use, all died. In July of the following year 405 trees were received, of twenty-four varieties. Of these 123 trees died, leaving none of three of the twenty-four varieties. From these nearly 678 suckers have been taken, all of which have been planted and are doing fairly well. Up to 1904 a net crop of about three hundred pounds of fruit had been harvested, and in 1906 some four thousand pounds of dates were produced in the garden.

Gophers are found to be great enemies to the palm, as they are to most tree-growths in irrigated regions. They burrow to the succulent roots which they eat, often following them into the heart of the tree, which they eat out with fatal results. Where the palms are on heavy soil this is not so liable to occur as where they are planted in light sandy soil.

But in spite of gophers and other disadvantages, date culture has so far progressed in Tempe that it may safely be said it is no longer an experiment. The ability to make the large shipment of offshoots, above referred to, was owing to the Yankee ingenuity of Mr. Swingle, who made a bold and (to the Arab and French and English merchants) startling innovation in the method of packing and shipping the offshoots. It had been the custom to send them rooted in tubs. This meant great expense in the care of the young plants for a year or two in the nursery, and then tremendous freight charges on account of the bulk, weight, and perishable nature of the plants.

Mr. Swingle wrapped damp moss, or the fibrous material found on the mature palms, about the bases, and tied it firmly in position with stout cords, and then shipped the plants on camels ninety miles over the desert to Bishra. Here they were unpacked, reëxamined, labeled, repacked, and sent in a special car by rail to Algiers, three hundred and ninety miles away, where they were once more examined, watered, trimmed, and packed in ordinary wooden boxes for shipment by steamer.

As a result of the adoption of this new method of packing, the expense of transporting offshoots from the Old World deserts to Arizona and California was cut down to less than one-tenth of what it had been and yet a larger percentage were made to grow. The heavy losses in the first importations were all among

date offshoots grown in tubs a year before they were shipped, whereas this very first shipment of offshoots packed by the new method gave over eighty per cent of successes, though the Arabs do well to get seventy-five per cent of the offshoots to live when they are merely moved from one field to another.

This first large shipment left Algiers, June 13, 1900, and reached New York, July 3, where another careful examination took place. The Morgan Steamship Line and the Southern

The experimental date farm at Mecca

Pacific Company kindly offered to transport the twenty-three cases, weighing eight tons, free of freight charges to their destination, and on July 17 the palms reached the Tempe siding where Professor Forbes was waiting to receive them. They were immediately unpacked, disinfected, planted, and irrigated with the results as before shown.

Mr. David G. Fairchild visited Egypt in 1901, and a year later, acting as agricultural explorer for Mr. Barbour Lathrop, of Chicago, he went to Arabia, Persia, and Beluchistan in search

of choice date varieties. He introduced the standard second-class sorts, Halawi and Khadawi from Bassorah, the Fard date from Maskat, as well as many better sorts that do not reach the American markets. Among the latter, the Khalasa date deserves mention. It comes from the interior of Arabia, some sixty miles west of the pearl island, Bahrein, from a region called Hassa. It is considered by the celebrated traveler, Palgrave, to be "the perfection of the date." A number of offshoots of this variety are now growing in Arizona.

Finally in 1904–5, Mr. Thomas H. Kearney visited the Djerid date region in the Sahara Desert in Southern Tunis in order to study date harvesting and curing and to secure the celebrated Menahker variety — a sort much larger than the Deglet Noor, and of equally fine flavor.

He studied in detail the date harvest and secured nearly sixty varieties, including the Menahker, now nearly extinct in its native oases. Mr. Kearney finds that in former times the Bey and other high dignitaries were excessively fond of the Menahker dates and frequently appropriated the entire crop, neglecting, of course, to pay for them. Finally the proprietors, in disgust, stopped planting the variety and even went to the length of cutting down old palms in full bearing.

Mr. Kearney fortunately was able to find a few surviving palms still bearing offshoots. Only with great difficulty and by the exercise of much diplomacy did he finally succeed in inducing the owners to part with nine offshoots of this precious sort, and even then six of these offshoots were so small that little hope was entertained of their growing. Great care, however, was given them on their arrival in this country and all of them are now growing.

Besides the date-palms secured by expeditions sent to the deserts of the Old World by the Department of Agriculture, many other varieties have been secured by correspondence with native Arab merchants, European managers, and American consuls, until now both Arizona and California can boast of having larger and better collections of varieties than are to be found in any single oasis in the Old World.

When the climatic conditions of the Salton Basin were understood by Mr. Swingle he urged the immediate establishment of

an experimental date garden there, and Mecca was chosen as the site. It had already demonstrated its kindness to the fan-palm in its native state and in addition a date-palm had been growing successfully for the past fifteen years at Indio, only a few miles away. Some two hundred to two hundred and fifty pounds of fruit a year are said to have been produced by this palm in recent years.

In 1904, Mr. A. V. Stubenrauch, assistant horticulturalist of the University of California, directed the planting out of about seven hundred trees. Of these not quite half are now living, most of them thriving and doing well. Mr. Swingle has taken and still takes the greatest possible interest in the farm and visits it as often as his duties in Washington will allow. The Deglet Noor, which does not ripen well in Arizona, is expected to ripen here, as the temperature in the summer season is warmer than in its native Saharan oases. The summer is warmer and comes earlier than in Arizona, melons ripening in the Salton Basin some three to four weeks earlier than in Arizona. The mesquite also blooms some fourteen days earlier as well as bears earlier fruit.

Palms at Hanlon ranch

In 1860, also, Mr. Hamlin, one of the oldest settlers at Yuma, planted several palms from the seeds of bought Mexican dates, at his place on the Colorado River six miles below Yuma, where they throve and did well, having borne fruit for many years.

The date industry in the Salton Basin is considered of sufficient importance to warrant the creation by the government of still another date garden besides the one at Mecca. Steps are being taken this year, 1906, to establish the new garden near Indio above any possible danger from the rise of Salton Lake.

A number of Deglet Noor date-palms in the Salton Basin are loaded with fruit for the first time this year, 1906, and in spite of the fact that the young trees do not ripen their fruit so rapidly as old ones and also of the unusually cool weather that prevailed during May and June, the dates nevertheless promise to

mature earlier than they do in the Sahara and in time to reach the Christmas market.

The soil should be a sandy loam. Too heavy, clayey soil does not take up water fast enough, as evaporation in the Salton Basin is exceedingly rapid. If the soil is too light, on the other hand, it does not contain enough nourishment for the plant and is unable to retain the moisture needed.

At first sight it would be thought impossible for anything to grow in so alkaline a soil as this evidently is. Analysis shows, however, that dates thrive well in Algeria where the soils contain a far greater percentage of alkali than in most parts of the Salton Basin. The date is peculiarly able to resist alkali; up to a certain extent, indeed, a small amount of alkali is to be desired rather than otherwise. Indeed it is now pretty well established that in the marvelous laboratory of Nature, provision is made in the constitution of the palm to utilize the alkali as plant-food and that, therefore, a proper amount of alkali is an advantage and not a detriment.

Other remarkably favorable conditions existent at Mecca for date growing are the facts that artesian wells supply an abundance of water, and that it is slightly warm as it comes from the interior of the earth. Cold water used for irrigation checks the growth of the palm and hinders the ripening of the fruit. With water already partially warm — warm enough for all seasons — as it comes pouring out of the wells in abundance, Mecca and the whole Salton Basin are highly favored.

The result of the experiments so far have led to the planting of a number of acres in dates, one planter alone having just put in several thousand seeds and offshoots. Under the kindly direction of Dr. Wellwood Murray, the Coahuilla Indians at Palm Springs also planted in August, 1905, twenty-four date-palms, which were supplied by the government. They were of assorted varieties and are held by the Indians of the reservation in common. So far they are doing well, and, unless the Indians grow weary of caring for them before they come into bearing, it is confidently hoped that they will become a source of palatable and nutritious food, and of revenue as well. At present all but one are alive and growing satisfactorily.

It will be apparent, therefore, that should all the palms of the Colorado Desert and of Arizona come into bearing, these regions will soon revolutionize the trade in dates in the United States, as the West has already done that in oranges, lemons, prunes, walnuts, etc.

On the trail up Palm Canyon

It is interesting to note that, unlike most fruit trees, the date is a diecious plant, that is, its flowers are borne on separate plants; one is male and the other female. While in their native state the separate trees grow in such proportion that pollenation is natural,

the Arabs have brought the culture to so high a degree that they grow only a ninety-seventh part of the male trees that Nature requires, and they artificially pollenate by binding the male flowers, with their abundance of pollen, in the sheath where the female flowers are coming to maturity. In some cases where the female flowers mature first and the fruit would be lost because of the lateness of the male flowering, they have learned that they can save the male flowers over a year and then artificially pollenate this year's female flowers with last year's male flowers.

The flower-clusters generally come about the month of April, and on the female tree will vary from five to twenty clusters, not all produced, however, at the same time. The clusters shoot up from the stem, about as thick as the wrist, beautifully

Palms in the foot-hills near Indio

enclosed in their strong protecting sheath. When the sheath opens the blossoms are found to be white, thus adding the charm of contrast to the rich green of the leaves. Each flower-cluster on the female tree produces a bunch of dates, the fruit growing in numbers on slender twigs. A vigorous tree is commonly allowed to produce from eight to twelve such bunches, and each bunch will bear from ten to forty pounds of dates.

Rain has a directly injurious effect upon the palm. It not only prevents pollenation of the flowers in the spring, but it rots the fruit and makes it drop before maturity in the autumn. The effect of the moisture is to cause a rapid fermentation of the saccharine matter so that the dates spoil when ripening. Hence the great advantage that the Salton Basin region has over other

desert areas where, however, rains come either in spring or autumn.

Though the date can be planted and grows successfully from seed, it is often found that a good date will produce a poor palm. This is due to the fact that the pollenation of the growing fruit has taken place from a worthless male tree. Hence it is deemed the only safe course to propagate from offshoots, taking them from trees of high pedigree. These offshoots spring up from around the base of the trunk, and reproduce the parent plant exactly. They are produced abundantly by young palms, but cease to form when the trees are from ten to fifteen years old. When the offshoots are from three to six years old they can safely be removed from the parent stem and transplanted. They require an abundant and steady supply of water.

While the date-palm requires great heat to develop its fruit, it is capable of standing considerable frost. On December 24, 1905, the thermometer at Mecca was down as low as 18° Fahrenheit, and while young, weak trees were killed, as well as recently planted offshoots that were not yet rooted, the older trees showed no ill effect from the frost.

Altogether the subject is a most interesting one, and I confidently expect that a couple of decades from now will see the major portion of the ten million pounds of dates used annually in the United States growing in the highly favored localities of the Colorado Desert, or similar places in the sister region of Arizona.

CHAPTER XXVII

The Burro on the Desert

ON the desert fourteen-fifteenths of the travel away from wagon roads would be impossible without the burro. It is the standby of the prospector and the desert enthusiast.

Centuries before the camel was brought to our American shores the burro had proven his worth, had demonstrated his strength, endurance, and reliability. Sweet-tempered and patient, too much of a philosopher to ever hurry or worry, he becomes a mental and spiritual guide, voiceless but practical, unobtrusive but insistent, to every intelligent man who is long in his company on the desert. I think much of the burro and his intelligence. I gladly claim kinship with him, though that means that I write myself down an ass. The burro knows many things better than most white men, even the intelligent ones — desert-intelligent I mean — such as I am *a little*. Twice burros have saved my life by finding water when my intelligence could not discover it, and often their trail-craft has proven safer to follow than mine.

True, they can be as mean as humankind at times. They will provokingly get off the trail, hide in the dark, and let you leave them behind for miles, even when they have a pack on their backs. True, they sometimes have the provoking habit of going down on their knees, purposely, I verily believe, when they are on the worst possible places on the mountain trails, and they know you will pitch heels over heads — their heads — to your eminent danger and discomfort.

True, they will wander off sometimes and leave you in the lurch if you do not bind them to you with cords of — stomachic — affection. A pint or, better still, a quart of grain three times a day makes a "threefold cord" that binds as much as love.

Yet in spite of all these things the burro is man's invaluable companion and servant on the desert.

On our trips we had three burros, Babe, Kate, and Jennie. Babe was happy in the recent acquisition of a baby, and as soon as I saw her I dubbed her Marchioness, exactly for the same reason that Dick Swiveller called the little kitchen maiden by the same name.

The Marchioness was a sweet looking, cute little creature and I was at once undone by her charms. She had a tiny, dainty, clean white muzzle, with white patches of perfect evenness and balance under her eyes. Her color was of brown, shading off into mouse, and on the course of her spine, as straight as if it had been put there by a ruler, was a line of black, reaching from between her ears to the very tip of her tail.

Our three burros

But she was a deceitful piece of baggage. I shall never forget how she wandered away one night from her pseudo owner, following in the sweet moonlight some Indians or Mexicans who thought to lure her away and keep her. My friend, riding on the back of her patient and devoted mother, followed her for long weary miles over the salt-bush strewn, effloresced soils of the region northwest of the Salton Sea to Fig Tree John's. She refused to be called back home even by the voice of her own mother, and the poor rider simply had to keep chasing her, as an enthusiast chases a butterfly, or an irate sleeper a flea, and like the butterfly or the flea, whenever he dismounted to catch and tie her, the irresponsible, irrepressible, bewitching, aggravating little creature, with a flap of her long ears, a flit of her tail, and a snicker, as if in derision, would kick up her heels and run off, and the chase had to be begun again.

The way we happened to find this out was that we had been visiting at the Indian village of Martinez. We started for Mecca late in the evening. We were indifferent and careless about

roads, and the desert air and the witchery of moonlight made it impossible for us calmly to decide where we were and which road we ought to take. So blindly and wildly we drove across the desert, back and forth, up and down, as the sweet will prompted of the one who held the reins, and thus in our inconsequent shuttling back and forth — for we should have got nowhere until morning on the plan we were following, and didn't much care whether we did or not — we ran into our friend just as he had succeeded in catching the Marchioness and was dragging her behind him, a captive against her will.

But she never resented any kind of treatment, and though thus dragged home, the next day she was as naïvely affectionate, familiar, and confidential as before.

When we started off for the Brooklyn Mine I took the box of the wagon and Van rode Kate and was to drive along Babe and Jennie who were packed.

Jennie

He confidently expected the Marchioness would follow. She did, but it was her own sweet will, rather than her mother, that she followed. Unconscious of his difficulties, we in the wagon ahead slowly plodded on, until in desperation he decided to leave her behind. Fortunately she was cared for in our nine days' absence, and having perforce become weaned in this time she found herself henceforth, to her mother, merely as any other burro, and the sweet relationship of mother and daughter ceased to exist.

The burro has been made the object of many a poet's lofty strains. Here is a quatrain I found in the heart of the Colorado Desert posted on a prospector's cupboard door. I congratulate the unknown poet.

> "I am a burro, the loftiest peaks all unafraid I scale,
> Picking my way, sure-footed, along the dizziest trail;
> I lead in pioneering work which, but for me, must stop;
> I am a burro, patient, dumb, but always at the top."

While the merciful man is as merciful to his beast on the desert as in any other place, it must not be forgotten that an animal on the desert means far more to a man than in any other place. The mule or burro he has taken with him is his sole and absolute dependence. Without it his life is in danger, much travel is almost an impossibility, for man unaided cannot carry the food supply he needs, and while the desert does, in its own peculiar way, afford browse and picking for the animal, it offers but little except to the very well informed, and not much to him, in the way of food. Hence it is imperative that a desert traveler do two things: he must take as good care of his animals as he possibly can, yet he must under no circumstances run any risk of letting them get away from him. These two imperative conditions often seem to come in direct conflict, yet they must never be lost sight of or forgotten. Let me enlarge somewhat to make the grave importance of the matter clear. Many of the desert tragedies that have been recorded, and hundreds that have not, have come about through carelessness about tying up the mules or burros; allowing them to wander unhobbled in search of food; or leaving them untied (only hobbled) at night in order that they may "pick up all they can." It is in strict accordance with the first imperative condition I have laid down that animals be given every possible chance to get all the food they need, but in doing that it is more imperative still that nothing be done to jeopardize human life. An untied mule or burro, unhobbled, may be frightened away from the prospector's camp, or be maddened by a horsefly or gnats until he has traveled twenty miles. If water is scarce a hobbled animal will often travel twenty miles at night in order to reach it. I have been a personal sufferer several times from this very cause. Once on the Painted Desert our animals, all hobbled, deserted us and went back many miles where we found them digging for water. On another occasion when on the way to Lee's Ferry, I spent a lonely day in camp, my driver having started off to fetch in his horses before breakfast, and following them for sixteen miles before they were caught. Had he not been an exceptionally desert-hardened man, that thirty-two miles — sixteen on foot and sixteen on a saddleless horse — would have so exhausted him as to render his return to

where I was camped somewhat problematical. What then could I have done had he failed to return? On a road where water could be found only by the well informed, hidden away in secret tanks up tiny canyons, or under unmarked arroyo banks, no ordinary traveler can conceive the horrors of the situation. To walk in the intense heat without water is almost an impossibility. To carry provisions is to add to the difficulty, and yet to go without them equally impracticable. Then, too, it is disturbing, to say the least, to the peace of mind of the strongest-hearted to find himself in a strange place, uncertain as to the road, often where there is no road at all,— nothing but landmarks over a trackless desert,— short of water, and *alone*. No wonder that many men break down under it, grow confused, become delirious and finally perish in their aimless wanderings.

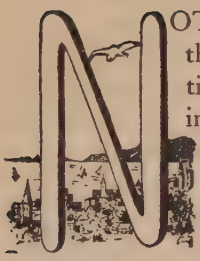
Throwing the diamond hitch

Hence the emphasis of my caution: never run any risk in tying your animals. See that your tie-ropes are of the strongest and most reliable. See that you tie only to the strongest of trees or around the base of bushes that are secure. Be ever alert in this regard, as one act of carelessness may cause the loss of your life, as well as those of others who are dependent upon you. In my "Indians of the Painted Desert Region" I have explained how an animal may be picketed to a hole in the ground with perfect safety, so that there is no excuse for not tying up securely even though there seems to be nothing to tie to. If animals are thus tied up at night it is necessary that a day-rest be taken, their packs removed, and an opportunity given to them to eat whenever a place that seems to afford feed is reached. In the daytime they can be watched, and while vigilance must not be lessened it is then more readily and easily exercised.

Burros' lunch time

CHAPTER XXVIII

A Tramp from San Diego to Yuma



OTHING can give a clearer idea of the desert than days of traveling over it. General descriptions are often confusing on account of the impossibility of properly locating the many and various objects described. In a detailed description of a trip from point to point, however, the reader can look upon the map and follow, step by step, the journeyings of his author and thus gain a true conception of at least that part of the country described.

For this reason I propose to devote several chapters to trips that few people nowadays make,—trips of hot, weary days of tramping, and, as a rule, cool, delicious nights. Three of us—Mr. Carl Eytel, the artist, Mr. Lea Van Anderson, my general assistant, and myself—were concerned in these trips. Sometimes one and sometimes another wrote the description; sometimes one went alone, sometimes all of us together; but to secure uniformity in the narrative I have written all the accounts in the first person and as if we had all been together.

We purpose to tramp from San Diego to Yuma, across the desert, on the historic trail of Kearney and St. George Cooke, where the Army of the West met its sad defeat at San Pasqual and the gallant Captain Johnston lost his life.

On the summit of Spring Valley Hill we turn to bid farewell to the Pacific Ocean, which gleams, a polished mirror, bordered by the green beauty of the verdure and the rising hills, fifteen miles away. Peeping through the rich green veil stand the walls, towers, and shining roofs of San Diego. Before us, beckoning to the east, rises hill after hill, clothed in somber green, mysterious and silent. Down through the valley, past lemon groves and

wheat-fields, leads the highway, showing a ranch-house here, a patch of cactus there, now a cluster of oak trees and again chaparral and fields.

At noon we rest under the shade of willow trees in which the blackbirds chatter. Two Indian lads come along, chasing a goat. The boys are trying to lasso the goat, but the animal evades the noose that circles over his head many times before it is finally caught securely on one horn and thus leads to his capture. Then an Indian woman, with a bundle of clothes, comes to the near-by pool, and we are soon in interested conversation. She tells of the rainless years that have made more wretched the poverty of her people; of the avarice of the whites who constantly seek to get possession of the little land she owns; of her efforts

El Campo

to hold on to it. Her sister is married to one of the leading men of the Cocopah tribe, and wished her to go and live with them, but the journey is long and she prefers to live and die on the soil that she has known and loved from childhood. She tells of her husband who warned her against the whites and especially the white lawyers, and then it develops that her husband was a white man and perfectly familiar with the snares and pitfalls of the law.

We bid her adios! as many miles are ahead of us to be traveled. We find a dry country, sparsely settled, and the few inhabitants living in hopes to see the rain after several "dry" years. How beautiful this region would become if a stream of water could be made to flow through it!

Now we pass through Dulzura and Potrero, a valley enclosed

by mountains which rise higher and higher to Mount Tecarte, on whose brow a forest fire makes a smoke-wreath.

At last Campo is reached, the terminus of the stage line from San Diego. It used to go through to Yuma and then on, and on, crossing deserts, plains, mountains, and rivers to St. Louis, and the old stage-station here is full of memories of those early staging days. The massive stone walls, too, of the old store, built to withstand Indian attacks, the custom-house, the old custom-house officer, could all give lively accounts of exciting times in the former days when Mexicans and Indians from across the line, and bandits on this side, kept things from stagnating.

Campo is an ideal place for the romancer. Here he may dream under the shadow of mighty oaks while his eye wanders over green pastures. He may take his gun and follow deer, wildcat, and mountain lion, or visit Indian rancherías and learn of the life of this fast dying out aboriginal people.

Ruins in Hill's Valley

It is very early morning when we leave, passing the silent houses, the valley pasture, and the lone schoolhouse. Our road soon gleams like a white ribbon in the morning sun, playing hide-and-seek, yet never so charming as when it leads us into a green spot where we find clear, cool water. For we are near to the desert now, and the heat of October keeps the body very dry and tramping is not easy under such conditions.

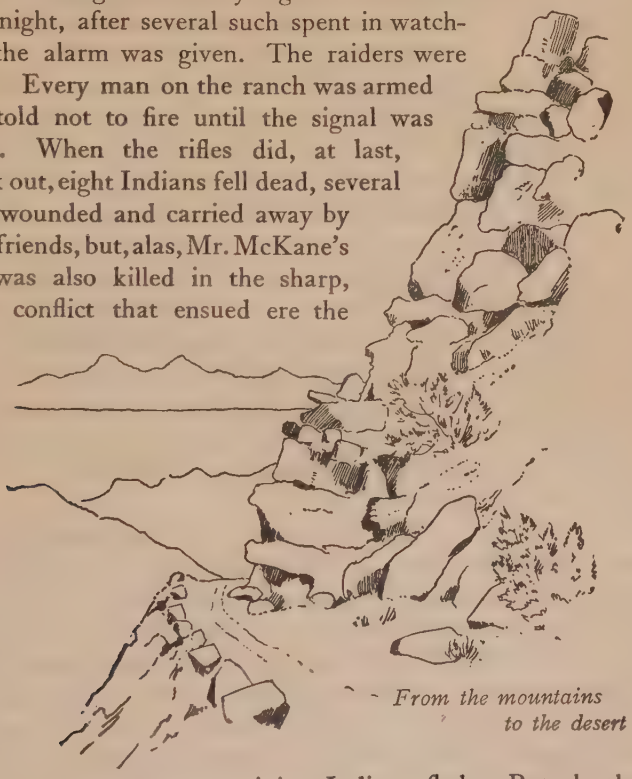
Soon the ruins of a stone cabin and stone corral walls indicate that we are at the abandoned stage-station of Hill's Valley. But everything is deserted. There is neither man nor animal here, nor do we see a living creature while we march on the sandy, uphill road. A fire has raged over the hillsides and burnt or withered all the chaparral, making the dreary waste of hills darker, drearier, and sadder. Behind the gloomy ridges new barriers loom up, while a dark blue wall seems to shut us in on

every side. Here and there are deserted ranches, silent witnesses to the tragedies that inevitably come when men, ignorant of desert conditions, endeavor to wrest from Nature what she is reluctant to give. Ahead of us is a striking, narrow gap and we picture ourselves passing through it into the desert, but the road winds us away from it back into the hills.

More deserted ranches are passed, then we descend into a valley, where ahead of us we see the grateful shade of cottonwood trees. This proves to be the Jacumba Ranch and one of the old stage-stations, now kept as a rural sanitarium by an hospitable couple, Mr. and Mrs. Foster. Not far from the adobe ranch-house are the sulphur springs, and in the bath-house, with three somersaults, you may take three separate baths at three temperatures, ranging from cold to hot, the latter being at about 100° Fahrenheit. Resting in the shade of the brush veranda we listen with interest to our host as he tells of the early history of this stage-station. How that the McKane family left their home in Texas, traveled in a prairie schooner over the plains and deserts of Texas and Arizona, crossed the Colorado River, then the Colorado Desert, and finally settled here among the cottonwoods and near to the healing waters of the springs. The *real* California of verdure and flowers they never saw. This was good enough for them. They could make a good living caring for later desert travelers, who would be glad of anything after the horrors of the desert. But it was not all restful and peaceful. They were near the boundary "line" of Mexico and the United States, and they found it had long been a natural rendezvous for the outcasts and desperadoes of both countries. No wonder when they built their adobe ranch-house the windows were made small,— just

Ranch-house at Jacumba

large enough to peep through behind the barrel of a rifle. They invested their little cash in stock, but they found it hard work to guard it. Indians played havoc with it. Raids by night were frequent and the robbers tauntingly and boldly displayed the hides and horns of the stolen and slaughtered cattle. Then the Texas blood asserted itself. It decided to put a stop to the whole thieving business by vigorous methods. One night, after several such spent in watching, the alarm was given. The raiders were here! Every man on the ranch was armed and told not to fire until the signal was given. When the rifles did, at last, speak out, eight Indians fell dead, several were wounded and carried away by their friends, but, alas, Mr. McKane's son was also killed in the sharp, short conflict that ensued ere the remaining Indians fled. But the lesson was learned, and from that day the Indians have let the white man's cattle alone at Jacumba. The white and Mexican bandits and desperadoes are given short shrift, too, and the line-riders are constantly busy, riding back and forth, patrolling the boundary, guarding the frontier from smugglers, criminals, and the unlawful entry of Chinese. This "line-riding" is not generally understood.



From the mountains to the desert

Wherever Uncle Sam thinks there is a possibility of illegal entry of any kind from any country into our borders he establishes a frontier patrol, and, between Mexico and the United States from Yuma to San Diego, this patrol is in active, daily service.

At Jacumba we met Mr. Hutchins, the Chinese inspector, and accepting his kind hospitality, were soon listening to his interesting experiences in the discharge of his duty, which is to allow no unentitled Mongolian to cross from Mexico into the United States. A short time before he had received warning that a band of Chinamen would doubtless try to cross the line at a certain point. The three "line-riders" of Campo, Jacumba, and Silsbee joined forces and waited and watched. The Chinamen had chosen a dreary rainy day for their illegal entry. Said he: "We saw them coming and secretly got as near to them as possible. They were trudging along, doubtless picturing themselves safe in San Diego, when, suddenly, we charged them at full speed, firing our revolvers in the air. It was a surprise party! The poor fellows sank to their knees crying out in their excitable way, doubtless pleading with us not to kill them, and seemed much relieved when we merely surrounded them, bade them march on, and the following day jailed them at Campo, there to be photographed and tried for entering Uncle Sam's territory without his permission."

Out of the green valley of Jacumba the road leads upward again toward the crest of the mountains. A rapid change in the vegetation announces the very close proximity of the desert. Cottonwood, chaparral, and live-oaks disappear. The agave, Bigelovii cactus, opuntia, creosote bush, and other desert plants take their places. Before reaching the summit a sign-post attracts our attention. It is one of those told of in the chapter on Sign-boards. An iron tablet, painted in black and white, fastened to an iron post, tells us it is still ninety miles to Yuma, and seventy-three to San Diego. Friendly guardians of the desert road, how grateful weary travelers are to the thoughtful supervisor Jasper, who erected you! These sign-boards are seen at intervals on this desert road, giving not only distances in both directions, but directions to reach the nearest water.

At length we are on the crest, 3,800 feet above sea-level. What

a marvelous panorama. It is a weird vista of the far-reaching Colorado Desert. Mountain chains rise out of the grim waste and slope into it again to mix with the infinite sand-plain. Far off toward the east in shadowy blue tints are the pointed, needle-crowned mountains of Arizona. Dark green lines are drawn on the hazy horizon, and in the far distant Imperial country water is shining.

Descending the steep mountain road, we are soon gladdened by the sight that, of all others, is most delightful to the weary traveler, clear, cool, pure water, led by a pipe from the near-by hill into troughs. Close by are standing the walls of a ruined house, and under the sloping walls of one of the hills are stone corrals sufficient for the horses and mules of a cavalry regiment. Here in the old days high carnivals and revels were held. Whisky, cards, singing and such revelry as rude and wild men enjoy saw the hours pass, for here teamsters, prospectors, miners, and other desert wayfarers used to meet where there were no restraints but their own appetites and passions. And yet, the whilom owner of this desert whisky-hell is now a peaceful, useful member of society, an earnest worker in the Salvation Army in one of the cities of the Pacific Coast.

Coyote well, on road between San Diego and Yuma

Leaving here we journeyed through the Devil's Canyon, a rocky gateway and pass which does not in the least suggest to the casual eye that not far away is a mine where valuable stones and gems are found. One particular precious stone called hyacinth is found and is now being cut and marketed in quantities.

As the sun sets, the hills sloping down into the desert change suddenly from dull brown, as if the Master Artist Himself had touched them with a color full of life. They blush to a rosy alpen-glow, while the whole desert valley beneath is filled with

a flood of golden light. And the sky! A changing spectacle of emerald green, gold, and azure, playing, interchanging, blending, until finally all colors fade away and mountains and desert alike sink to sleep.

But we are still far from water. Devil's Canyon looks gloomy and forbidding, so we push on. Gradually the walls decline in height and recede, and soon we are free from them. Then the moon shows us a sign-board, "four miles" to the next watering place. Near! But too far for tired wayfarers, so, unrolling our blankets, we are soon asleep on our sandy beds.

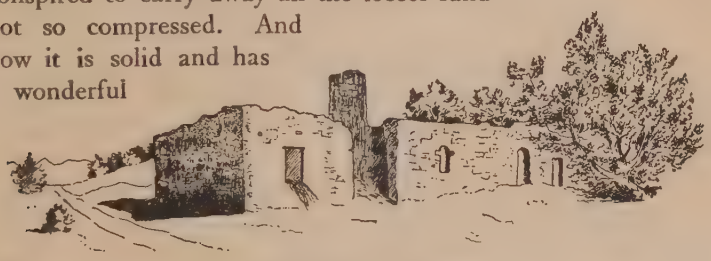
The water is found at Coyote Wells early in the morning, and used for our breakfast cooking. Then we rest all day, lounging and enjoying the scenery,— that which we had left and that which

Blue Lake, Imperial Valley

is before us. A traveler with his wife passes, bound for the settlements of the Imperial country, and that night, while around our camp-fire, a Mexican family in an eight-horse wagon arrives. When the "chores" are attended to, and the evening meal disposed of, violin and guitar are brought forth and sweet voices are soon mingling with the tones of the instruments in soft Spanish melodies of love and romance.

Then we sleep. Before three o'clock in the morning the singers are up and off, and we prepare for our sixteen-mile tramp over the desert. It is an entirely barren stretch save for a few ocatillas and half-starved mesquites. Then we pass a solitary grave of a thirst-maddened traveler, and as we do so see stretching out over the desert the deceiving mirage of lake and rocky shores. We

are safe, however, for each man has his own canteen, and we know that, with care, our water supply will carry us to the next watering place. Yet that wizard lake! How it deceives even our practical eyes! Blue mountains are clearly reflected on the placid surface, and palms are standing *in* it, a peculiar feature seldom seen. Almost instantly it disappears, and as we seek for it, another and different kind of wonder arrests our attention. The wheel-tracks of wagons and the tracks of horses are sculptured in sand and stand out a foot or more higher than the surrounding plain. What a wonderful example of the way Nature accomplishes things! Here the pressure has cemented the sand together (with a sticky admixture that made it possible). Then the winds and rains and an occasional cloudburst have conspired to carry away all the looser sand not so compressed. And now it is solid and has a wonderful



Indian wells near Silsbee

appearance. Not far away is a hill of monster oyster shells, elsewhere referred to.

A few more miles and the landscape changes again, and to our delight we find flowing water. It is Colorado River water, brought hither by the work of man. We have reached the Imperial country. And as this region occupies a complete chapter in this book we pass over its description here. We rest awhile on the banks of Blue Lake, pass through Silsbee and at night see the sky put on its pink vesture, with clouds trailing along streaked with dark red, while Signal Mountain, to our right, is aflame in astral fire.

Two miles from Silsbee, on the east side of New River, hides a remnant of the old adobe stage-station, Indian Wells. This used to be a strong and massive building, with walls like a fortress

and completely surrounded by a protecting wall. Inside this wall was plenty of water and wood, so that the station-keeper was safe from Indian attacks. How forcefully the lesson is driven home here, in sight of the green fields of cultivated ranches, how the romance of the stage-coach days has given place to the romance of the plow. On every hand now are evidences of human industry and prosperity. Calexico and Mexicali are passed, but there is little to buoy up the mind during the long march over dreary plateaus and through deep sand until we descend from a sloping mesa to the ruins of an adobe station. This is the famous Cookes Wells, dug by Lieutenant-Colonel, afterwards General P. St. George Cooke, when in 1846 he marched with the Mormon battalion from La Joya, New Mexico, to San Diego, California.

Where five canals meet in Imperial Valley

A day later we see the main canal of the Imperial Valley system, the dredger at work deepening its channel. On the canal bank sits a group of finely built Cocopah Indians, laughing and joking, doubtless at us, as we pass. Then, suddenly, they spring to their horses, which stand grazing near by, and ride as if they have to catch up with bygone centuries.

Cookes Wells

For two days we tramp along by this canal, — the former Alamo River, — and at length reach the ranch of the Algodones. This is the place of *Algodon*, the cotton plant. It seems as if this must be out of place here, this delicate daughter of the sunny South. But no, this is its native habitat as much as is the South. All through Arizona cotton used to be cultivated by the Indians long centuries before the Spanish appeared on this continent. There is a ranch-house at Algodones, and its hospitable door

opens to us, and we soon see why the Mexican inhabitants and the Cocopah Indians of the neighborhood live together in peace and harmony. There is the kind interchange of courtesies from the one side as well as the other.

Here a surprise awaits us. Our artist is busy making a sketch, a cluster of Mexicans and Indians around him, when, in picturing an Indian *kan* near by, a young Indian in fluent English asks: "For whom do you make this picture?"

"For myself!" responds the artist.

"Who gave you permission to make it?"

"I didn't ask any one's permission!"

"Well! it is my business. This house belongs to me and I don't wish a picture made of it."

The artist courteously replies, "That's all right. If you don't wish it, I won't draw it!"

This seems to please the Indian and he continues: "You Americans and Mexicans have different ideas from us. You like that way of taking pictures and photographs, but we don't like it. It is contrary to our ideas to have pictures of our men, women, children, houses, or horses, because some day all will be dead, and the pictures remain and are bad memories. It is bad for us then to see them, and it is bad for the dead ones, too, that we see them. I have been in Los Angeles and San Francisco, and as far east as New York, and though asked many times I never allowed any one to make a picture of me." This superstition of the Indian is well known, but it is not often an Indian can be found who will express it as does this young Cocopah. As we talk further he gives wonderful expression to the old adage, "There's no place like home." Our great cities impressed him, but, said he: "What does all this pomp and glory amount to, compared with the peace and happiness I find here in my quiet home by the Colorado River?" True! I often ask the question myself: Have we gained in happiness as we have gained in material things?

The following morning our host drives to Yuma with a wagon-load of cattle hides. The six horses have to strain and tug to pull their heavy load through the deep sand. Here are the vast sand-dunes spoken of in the earlier chapters of this book. Great

piles, several hundred feet high, stand between the ranch-house and the lowland of the Colorado River, which is now plainly visible. In the forenoon we halt in front of the adobe house of the Mexican customs official. On the high mesa to the left stands the white granite monument, No. 207, of the boundary line. With great politeness the Mexican officials shake hands all around and ask after our health. Then to business, and for four hours we stop to watch and listen to the wrangle that goes on. The custom-house officer finds it a hard task to convince the ranchero that Mexico not only expects her citizens to pay duty on the goods they import, but that she also requires that they do not impoverish the country by shipping away from it the goods she needs, and to prevent it she levies a tax upon the export of such goods as hides. This takes away the good humor of our host until, after we have driven on, the meeting of a compadre with a bottle of American *aguardiente* seems to bring back fresh sunshine.

On the line below Pilot Knob

The rest of the journey is along the bank of the Colorado, with its arrow-weed, carrizo, mesquite, and willows, and evening sees us at the old town, the scene of the labors of Garcés and his co-missionary, the site of their murder, and that of all the Spanish officers, former Governor Rivera among the number. On the east side of the river on the rocky height stands the Territorial Penitentiary, overlooking the town, just arousing to meet the new civilization and welcome it, while on the west side is the Indian school, occupying the site of the former Fort Yuma.

Boundary monument near Calexico

CHAPTER XXIX

A Tramp from Yuma up the Colorado River to Palo Verde, then by the Chuckwalla Trail to Salton

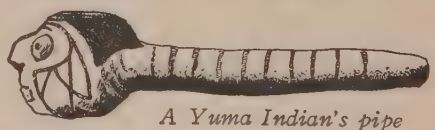
THE sun rose, a blood-red disk, the morning we left Yuma. Dark clouds hovered over the Indian reservation, but it did not keep the inhabitants from awaking. The squaws were lighting their fires to cook breakfast, the men were hunting their stock, or waiting until they were called to eat. Mesquite and palo verde are plentiful on this reservation, and, being well watered by the close proximity and frequent floodings of the river, grow luxuriantly, it being not uncommon to see them twenty-five and thirty feet high. This is the fuel supply not only for the Indians, but also for nearly all Yuma.

Leaving the valley we ascend the mesa, a dark plain strewn with volcanic rock. In sharp contrast to the yellow sky appears a saw-toothed range of mountains to the north, the highest of them, Chimney Peak,— called *Picacho* or The Peak by the Mexicans,—standing out with striking boldness. It seems a long distance away, but we know the way, having walked it some years ago. As we approach our day's destination quietness reigns in the mining camp of Picacho, where, two years ago, a large number of men were employed. Not a soul is to be seen, so, pushing forward, we walk through the canyon, five more miles, to the town of Picacho, situated on the west bank of the river. Numbers of buildings, many of which contain machinery, car tracks for carrying ore, large water-tanks, etc., give evidence that it has been the headquarters and shipping place for the mine. The ore was brought here on a diminutive railroad, and supplies hauled back. Boats then took it to Yuma, from whence it was shipped on the Southern Pacific railway. But now, with the exception of a

few families, the town is deserted. When a mine "shuts down," the town dependent upon it is "busted." Saloon-men and gamblers "pull up their stakes," women of the lower world seek fresh pastures, and all who can "haul their freight" as soon as possible. The grocery-man would go if he could. However, Picacho is pretty certain to rise again, as the "shut down" is said to be owing only to a change in management.

Yuma Indian carrying water

The day is dreary, clouds have been hanging low, and a few flashes of lightning, breaking through the dark veil, suggest the possibility of rain, so we resolve to eat and sleep indoors rather than at an open camp-fire, if it be possible. "A Mexican woman keeps a boarding-house near to the post-office," we are told, and, wending our way thither, we are soon at home, being entertained in true Mexican hospitable fashion. The landlady tells us of her father who for many years made the desert his home. He used to drive the stage from Los Angeles to Yuma and Tucson almost for the entire span of its history. In Florence, Arizona, he married a Spanish lady and then established a home in San Bernardino. We need nothing further to tell us who he was. Her father was one of the best known characters of the desert, Hank Brown, who died in 1898. What a varied and dangerous career he had! Said his daughter: "He once had trouble with the Indians at Martinez, where we lived for a time in the adobe house of the



A Yuma Indian's pipe

stage-station. They planned to kill us all while we were asleep, but, unknown to them, father had been called away. Fortunately for us a friendly squaw and her husband came and not only warned us, but took us away to a cave in the mountains, where for several days and nights we remained in safety. In the meantime the attack was made as planned and to the chagrin of our enemies we were gone. In their fury they burned our house to the ground. When my father returned he sent for the sheriff and in the fight which ensued three Indians attacked him. He was so quick with his revolver, however, that he killed two and wounded the third. Though arrested he had no difficulty in getting clear in court.

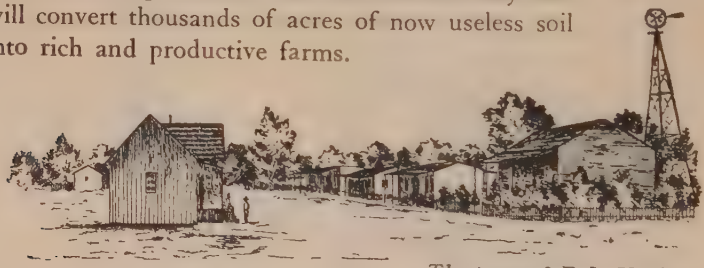
"He was an active, restless man, and seemed as if his energy

A street in old Yuma

would never give out. But he grew old and one day he said to me: 'Daughter! I will go out once more to the desert and when I return it will never see me again. I will settle down in Los Angeles, and you shall be my housekeeper and we will forget the desert.' Within a week he was dead. He went to hunt the Pegleg mine for which he had searched many years. This time he felt sure he had found it. He made the necessary locations, drew a map of the region, and completed everything necessary to make his claim lawful. Then he took the stage back to Los Angeles, but on the way was seized with sickness and two days later died of pneumonia. Feeling he would not recover, he gave a friend the map and transferred the claim to him. No sooner was he buried than this friend went back to examine the long-

looked-for mine, but, suffering intensely from inflammatory rheumatism, he scarcely reached the region before he was compelled to leave. He went to San Diego and died shortly after."

Thus the story of the long-lost mine lives, and we leave Picacho with the assurance that generations yet to come will send out men to search for this mythical treasure, the very existence of which we gravely doubt. This is the tenor of our thoughts as we walk along by the quietly flowing Colorado. What a river it is! Silent save for an occasional splash, as a salmon, catfish, or carp leaps out and falls back again, how different from the same river in the great canyon above! Soon its waters will be diverted into channels of usefulness and fertility. The great plans of the government are well under way and will convert thousands of acres of now useless soil into rich and productive farms.



The town of Palo Verde

The second day after leaving Picacho finds us at the small Mexican settlement of Milpitas, where maize, sugar cane, and alfalfa show what can be produced on this soil with sufficient water for irrigation. The river is about 300 feet wide here, and flows in long serpentine curves, and the far-away mountains, with their endless rosy crown of peaks, domes, pyramids, and needles, add that sense of charm and mystery to the scene that makes it perfect. Near here, lying parallel to the river for twenty-five miles, is the Laguna, and the land adjoining this body of water is the Palo Verde country where new settlements have sprung up, engaged in cattle raising and mining. The "town" of Palo Verde now consists of a post-office and a few houses, but, if the mines succeed and the irrigation plans that are contemplated are carried out, it may be that a few years will see this the seat of a new county. It is connected by stage with the station of

Glamys, on the line of the Southern Pacific, forty miles southwest.

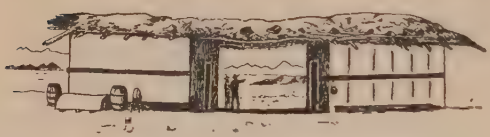
Here we meet a Mr. Hickey, a pioneer in Arizona of the early days. He entered the territory when it was in its brightest and most prosperous condition when mining and prospecting flourished. At that time there were no railways, and supplies were brought by ship through the Gulf of California, up the Colorado River to Yuma, where large and long wagon-trains waited to haul them east to Tucson and to the mines, ranches, and military posts scattered throughout Arizona and New Mexico. River steamers also hauled supplies up the Colorado to Ehrenberg and La Paz, then prosperous mining camps, and here again teamsters waited to haul them into the interior.

In those strenuous days when hostile Yumas and Apaches lurked everywhere, ready to murder every white man, woman, and child as foes to their race and existence, it was a dangerous business to be a teamster. Not only were the Indians bad, but there were Mexicans and white bandits, who hovered as near to the line as they could and thought nothing of taking life if thereby they could gain a few dollars.

To recover a few mules stolen and driven over the line, Mr. Hickey with a friend started in pursuit. They had not gone many miles into Mexican territory before they were surrounded by a band of desperadoes. To shoot would have been folly, for they were both surprised and outnumbered. Mr. Hickey tried argument, showing how little the bandits would gain by killing them and the possibility of arousing the United States government to take a powerful revenge by sweeping them out of existence. Unfortunately the actions of his friend were such, he neither understanding the language or character of the Mexicans, that his efforts at diplomacy were spoiled, and the leader of the gang marched them to a near-by tree and gave them the choice of death by hanging or being shot. Suddenly Hickey remembered that he had a letter in his pocket from the governor of Sonora, containing expressions of good will and offers of assistance to him, and as a last resort he drew it forth and asked the leader of the bandits to read it. When he did so, fearful of harming the friend of so powerful an official, the chief bade them

begone, and in a few moments the two friends were riding away, not daring to look behind, and yet with a creepy feeling running up and down the spine all the time lest one of the angered robbers should decide to shoot them in the back. Once out of sight they put spurs to their horses and did not slacken rein until they were safe again in Uncle Sam's territory.

The next morning before leaving we visit the schoolhouse. The teacher, a refined young woman, is but a type of her kind. She also is a pioneer, exactly as are the men who open the mines, dig the irrigating ditches, clear the land, and cultivate the soil. She is an important factor in the development of the country. In Palo Verde the school was first taught in the shadow of a large mesquite, then in a brush hut, and now in a rude frame hut. By and by let us hope it will be in a more pretentious and suitable building.



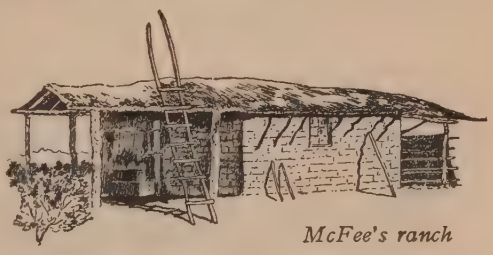
North Palo Verde mining camp

The settlers of this new country came from the "inside," as they designate the territory outside the desert, and they are therefore familiar with the process of irrigation upon which they here rely. With pumping plants they raise the water from the Laguna and distribute it over the land, though those who live between the river and the Laguna rely upon the usual overflows of the river, which generally occur between May and July. As soon as the ground dries sufficiently they plow and harrow the soil and then sow their barley and corn. When these crops are harvested sugar cane is planted in the fall, while in the earlier season potatoes, peas, beans, melons, chili peppers, and such vegetables are raised. The winters are mild and the summers hot, the temperature ranging as high as 110° and 120° Fahrenheit. Here, then, are conditions analogous to those seen on the Nile.

Brush schoolhouse at Palo Verde

Indeed the Colorado River might well be called "the Nile of America," as the lowlands of the Colorado are equally fertile with those of its African prototype.

Six miles from Mr. Hickey's ranch we reach the adobe house of the oldest settler, Mr. McFee, who "took up" his land in 1886. He keeps bachelor's hall and does his own cooking, washing, house-cleaning, and chambermaid work, as well as his planting and reaping. He has located close to the Laguna, which is here bordered by thousands of trees and dense arrow-weed, etc., thus affording an excellent retreat for wildcats, raccoons, coyotes, hawks, and owls. Mr. McFee had just shot a fine specimen of barn-owl, and was preparing the skin to make a warm nest for his chicks.



McFee's ranch

Here we met a prospector who was recuperating after a severe experience on the desert. He was prospecting in the region of the Chuckwalla Mountains when his burros strayed away, doubtless lured by the wild burros that are often to be found where there is water. He started off to hunt for them, but both provisions and water gave out and he was in dire straits. Then, fortunately, he struck the trail leading to the McFee ranch, which he no sooner reached than he was cared for and bade to make himself at home. And, such is the hospitable spirit of the country, there he will remain until he has entirely recovered from his arduous trip.

Leaving McFee's we strike out and soon come again to the river. Meadows of dried grass, which show how heavy is the growth after a rainfall, dense groves of mesquites, willows, and cottonwood, and acres and acres of arrow-weed line the river, while on the eastern side the sun-brightened mountains are coming nearer. Here we see the visible remnants of a desert tragedy. In the heart of a thorny mesquite stands part of an equine skeleton. Examination shows it to be the head, neck, breast, and front legs

of a colt. The head is turned back in the agony of death. Held by the sharp thorns the poor creature was attacked from behind by coyotes and his hind quarters literally torn from him and carried away. All around the bush are to be seen the hoof-prints of the mare in wild confusion, clearly showing her frantic but futile efforts to save her offspring from the murderous attack of the ravenous coyotes. In these mute remains and signs one can read the whole story. The mare and colt were doubtless feeding, the little one having strayed some distance away from its mother. While thus separated, hungry coyotes attacked it, and in its frantic efforts to escape it plunged headlong into the mesquite and was unable to extricate itself. The mare, hearing its calls of agony, rushed to render assistance, but was unable to force her way into the brush and drive off the relentless

Ehrenberg

coyotes, and ran around and around in wild, purposeless endeavors to help. As soon as the coyotes had torn from the quivering flesh the food they wanted, they fled to their holes. Something doubtless prevented their return for the remainder of the feast, hence the remnants we saw.

A little distance farther, and the presence of adobe houses, brush fences, and a couple of Yuma Indians denotes that we are opposite the town of Ehrenberg. The two Indians lead the way to a boat and with long strokes row us over to the Arizona side where, nearly dead, lies the once active, busy, and bustling mining camp and shipping point of Ehrenberg. The houses are empty and tumbling into ruins, all their former inhabitants gone, with the exception of half a dozen whites and Mexicans. Back of the town on the hill is a most desolate graveyard — for a deserted and neglected graveyard is one of the most desolate

places on earth — where irregular stone piles quicken the imagination until it sees visions of the days of activity, of strong, primitive passions, of the angry word, the swift blow, the smoke of the revolver or gun, and the quiet procession to the last resting place on the hill, while the silently flowing river steadily moves on to the sea. Many are the sad secrets buried under these shapeless cairns, — ruined lives, broken hearts, wasted powers, demolished ambitions, — speaking of the endlessness of the Passion Plays of poor, tragic, human life.

Ehrenberg from the Colorado River

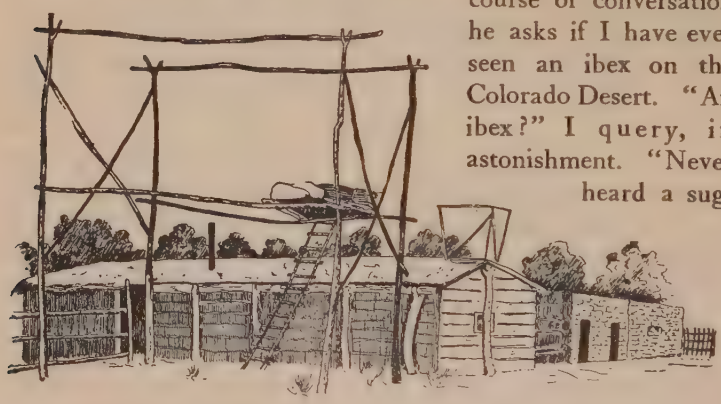
Poor Ehrenberg! He was an accomplished miner, — the man who founded the town. He came to a tragic end. There had been trouble with the Indians at Dos Palmas, and one night Ehrenberg was there. Hearing a noise outside he went to the door to see what it was, and in the dusk the Indians, taking him for their enemy, fired and killed him.

On crossing the river again to the western side we are misdirected. But the error turns out to our good fortune, for we take, instead of the old "California Stage Road," a road six miles south that leads us to "Old Brown's ranch." The pioneer whose name still clings to the place died several years ago. He was one of the restless, active spirits who, after wandering about, mining and prospecting for many years, settled down in these "bottomlands" of the Colorado River and began to raise cattle. But the Mexicans and Indians stole them so continuously that, at last, in desperation, he "laid for" the robbers and succeeded

Graveyard at Ehrenberg

in killing an Indian who was running off with one of his cattle. From this time on the old man lived a life of bedevilment and terror. The Indians sought in every way to kill him, and though he was able to outwit them, he decided to quit cattle raising. So he rounded up all the remainder of his herds and "cleaned them out" at five dollars a head, and then gave himself to the raising of melons and corn. Away from wife and daughter, who refused to live with him in this solitary wilderness, the end came, and he died, as he had long lived, entirely alone.

Near here we come in contact with a very intelligent miner and prospector who has spent many years on the desert. In the course of conversation he asks if I have ever seen an ibex on the Colorado Desert. "An ibex?" I query, in astonishment. "Never heard a sug-



Brown's ranch, near the Colorado River

gestion of such a thing." "Well," he replies, "it is a fact that they are here, although I know the naturalists would laugh and scoff at such a statement. While I have never been able to get near enough to shoot one, I have seen them many a time, and there is one rancher in the Palo Verde who shot an ibex buck and I have seen the horns, head, and skin that confirm his statement."

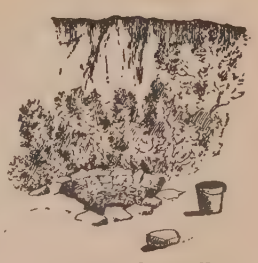
This is remarkable if true, and I express my astonishment and desire to inquire further into the matter. Later I meet another well-informed prospector and stage-driver, but afflicted somewhat with the propensity, acquired on the box, of "stuffing" inquiring friends. His eyes light up and he heartily responds:

"I'm blanked glad you spoke that word. Ibex? Ive seen them myself more than a dozen times, and I told the story to men who called me a deity-cursed old liar, and poked considerable fun at me. They said I didn't know an ibex from a jack-rabbit. How they got into the desert I don't know. I can only suppose they broke loose from some show or circus, but I know they're here as certain as my name is Sam Temple."

Chuckwalla storehouse

I find on questioning other men, many of them perfectly reliable, that there is a wide-spread idea that the ibex does roam and climb on the desert mountains, and the reason for it is very clear and the explanation equally simple. Young mountain-sheep have horns that grow out rather straight, not at all unlike those of the ibex, when seen at a distance, and they do not take on the characteristic curve of the full grown animal until later. It is these young mountain-sheep, therefore, that are mistaken for the ibex.

Leaving the river now, with canteen filled, we are soon on the Chuckwalla road. At night we sleep on the roadside, with a fine camp-fire of palo verde wood to keep us warm through the night. What a lonely road this is! It is a true desert road. Dipping into a wide valley flanked by blue mountains, on the far horizon a group of saw-toothed mountains stand which seem to remain at the same distance all day, though we trudge bravely along. Now we are wading through deep sand, then on hard gravel, while the surrounding country is covered with black, igneous rock as if it had recently been scorched by a fearful fire. There is no animal life in sight, save an occasional lizard. The signs of death are everywhere in the bones of horses and cattle, and the dried-up horns of mountain-sheep. Yonder lies a roughly made pack-saddle



Chuckwalla well

telling its own story of a straying burro, and possibly of the wandering prospector following on and on to his death. The noon hour is passed and there is no sign as yet of the Chuckwalla well. Surely we cannot have passed it. The road is well marked and we were assured that it would certainly lead to water, so we push on. Soon a change in the appearance of the country delights us. It is less barren and desolate. A trifle of green vegetation appears, to be more common later on; palo verde trees chopped with an axe are a good sign; and then a rock-wall and a tumbled-down rock-cabin appear at the foot of the hill before us, and on our arrival we find a rock-walled well, half hidden by mesquite bushes. This is the long-desired Chuckwalla well.

Dos Palmas

Here there comes over us the sadness of the desert. There are times when the desert seems to stir body and soul to joyful existence which finds expression in quickened steps and the lifting of the voice in song — to the amazement of the lizard and curious horned toad. But over certain localities there seems to hover the spirit of sadness and the soul is touched by the somber chords of past events that are still vibrating in the air. On the low hill, opposite the well, are two graves, covered with rocks to keep the coyotes from getting to the bodies. There are no crosses, no head-boards, — they are nameless graves. And yet we seem to know the whole story. The mind instinctively goes back to the days when wagons were banded together to be prepared for the attacks of bad Indians and worse white men and Mexicans, for the legends of the Chuckwalla trail are filled with stories of surprises, conflicts, and cruel deaths.

Before leaving the well we fill up our canteens to the very muzzle for forty miles' stretch before us. Forty long, weary, desolate miles — at least the first large portion of it is desolate,

and though we draw upon their contents often, the canteens grow very heavy to the shoulders before that long stretch is over. At last we rise to the crest of the plateau, and joy! there before us rises the blue line of the glorious San Jacinto Mountains, seventy miles away. As the night sinks, a roadside camp-fire is made and we sleep the sleep of the healthily weary. No need of an alarm-clock to awaken us; we are up before the sun and as rapidly as we can, though it seems slowly enough, we begin to descend the long mesa, and cross the wide sand-wash that leads us into the Salton Basin. Sandstone formations of fantastic shape attract the eye and tell of the power of atmospheric agencies, fierce wind and sand storms and the dashing of cloudbursts and mountain torrents. For this is a region where the elements often battle. It is nothing rare in the rainy season — which is generally in August or early September if it occurs at all — for a torrential rainfall to flood this country in a couple of hours and send masses of water, scouring out gullies and washes, down into the Salton Sink, there to be evaporated in a few short hours or days.

Soon we reach the approach to Canyon Spring, but it is closed to us, not by an angel with a flaming sword, but by a dead horse, whose fly-covered carcass blockades the narrow entrance and forbids our reaching the water. But our canteens still contain a little of the precious fluid, and the dead creature suggests that perhaps the water has earned its reputation of being arsenical, as well as bitter and nauseating with alkali. Before night we reach the tents, cabin, and corral of the Oro Copia Mining Company where we stop. Eighteen miles away this company of California capitalists has its mine. Water, almost as precious as the gold they seek, is piped from this post, and emptied into a reservoir that holds 28,000 gallons. It is needed not only for drinking purposes but to work the machinery and to operate the smelter.

Our canteens hang empty on our shoulders. There is no more danger of thirst, for in the morning, only a few miles farther on, are palms rising out of the desert, telling of the presence of an oasis where there is an abundance of water. It is Dos Palmas, well-loved spot of desert teamsters and prospectors; the old stage-station, where two springs supply an abundance of good water

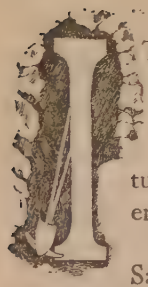
so that animals and men can drink all they desire without fear. Without this fine supply of water it seems as if the Chuckwalla trail, with its long weary miles, could never have been traveled, for here barrels and canteens for animals and men were filled, thus assuring the needful supply. A small shack, which serves as bedroom, parlor, sitting-room, dining-room, kitchen, hall, reception and smoking room, stands close by the spring, which is surrounded by beautiful trees, carrizo, grass, and flowers to which it gives life.

Below us, seven miles distant, is the edge of the wide Salton Basin, like a blue inland sea at this early hour, but soon, in the glaring sun, to appear as if of dazzling white marble. There rise the wooden buildings of the Salt-Works, in this early atmosphere looking like castles uplifting their proud heads from the level of the plain. Near by is the railway station whither we shall soon be hastening. Shall we be glad to reach the depot and find ourselves on the train whirling again into civilization? The trip has been hard, but it has had more than its compensations. We trudge on through the sand and reach the Salt-Works, which, however, we will not describe here as they find place elsewhere, and hope again, some day, to tramp over the Chuckwalla trail.

A mill for making adobe brick

CHAPTER XXX

Out to the Brooklyn and Granite Mines

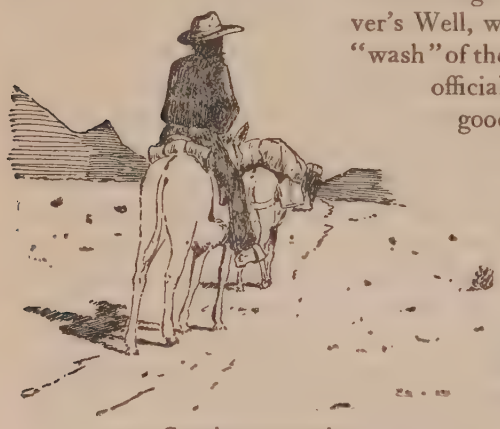


T was the day after the San Francisco earthquake that we started. We knew there had been a "shake," but it had not penetrated our conceptions that it was anything serious, so we went off into the solitudes totally unconscious of the gigantic tragedy being enacted up north.

For about four miles the upward pull is out of the Salton Basin to the "rim,"—the old sea beach, the level of which can be followed scores of miles in both directions. Across the valley, on the point below Fig Tree John's, it has left clearer markings than in any other place. It appears like a white wall of masonry, and as near as the eye can discern is on exactly the same level as the beach on this side.

As we approach nearer to the mouth of the canyon a wonderful object lesson is presented of the way in which Nature is working to change the condition of things. Millions of tons of gravel, sand, and silt have poured into the Salton Basin down this canyon, which is so small as to appear a mere insignificant scratch on the face of the mountain range when seen from the distance of a few miles. The nearer we get to the canyon's mouth the larger are the rocks brought down in the wash. The débris evidently piled up higher and higher until it was making for itself quite a promontory in the inland sea. Then, either before or after the evaporation of the waters, a tremendous freshet or flood came which cut deep into the recent deposits and washed them farther down. The banks of this channel still remain, and in a large measure they control the flow of the present storm-waters down Box Canyon. Within the canyon we are at once in a region full of questionings and surprises. The walls are of a crumbling clay and sand, with layers of gravel. Side gorges come down

on either side into the canyon, which, at this time, is beautiful with a large and varied flora. About half-way through a dim trail leads off over the ridge to the south to a water-hole, which occasionally has been of good service to travelers. It is in an arroyo known as Sheep Hole Wash, near to two small groups of palms. From the ridge one gains an idea of the barren desolation of this mountainous region. No words can express it. And to see the few palms quietly resting in this sheltered nook gives one a singular sensation. There was no water to be found when I stood at the bases of the palms, but it is possible that if one were to dig he could get a small supply.



Starting on a trip

That night we camped at Shaver's Well, which was sunk in the "wash" of the canyon by the county officials. The water is fairly good and the act of sinking the well is one that should be emulated by all the desert counties at convenient intervals along all the desert roads. From this resting place we crossed the head of Crawford Valley into Cottonwood Canyon.

This canyon is a pass through the Cottonwood range from Crawford Valley to Pinto Valley and is about three miles long. Approaching it from Box Canyon no possible entrance can be seen, but on nearing it the mouth is found to be nearly a third of a mile wide. The walls are not very high at the mouth, but they increase in height and ruggedness the farther one enters. Almost at the upper end they narrow materially until it is a distinctive canyon. The bed of the wash is of loose gravel and is therefore hard to travel. It is a desert canyon, yet owing to the rains it was full of rich beauty when we went through it twice in April, 1906. There were the ironwood, the palo

verde, and a few mesquite, with the ever-present creosote bush in full flower.

When near to Cottonwood Springs — not more than half a mile away if one were able to go directly over the range — the road used to make a wide detour around, of some three or four miles. The county officials were requested to construct a road over the short route, but with a stupidity that seems incredible, instead of having the county engineer or surveyor direct the work and expend enough money to make an easy graded, well-built road, they put the job into the hands of a local politician who spent three or four hundred dollars of the county's money in constructing what the teamsters call a "Chilcoot Pass," and over which only extra well-equipped wagons can pass. A light buggy with a good horse can go over with little trouble, but a two-horse wagon with an ordinary load finds it practically impossible. So, in our case, the wagon took the long road around, while I walked over to the spring. This is a beautiful little oasis, shut in by hills, and where half a dozen glorious old cottonwoods, dignified, hoary, and majestic, give gentle seclusion. Close by, seeping out of the rocks, is a steady though small supply of water, hence this has become one of the most noted resting places of the region.

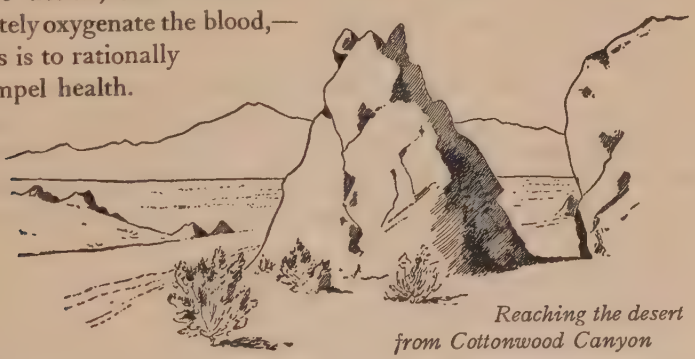
When Van came up with the burros we turned them loose to browse and then enjoyed getting our supper and sleeping under the trees.

Early the next morning I walked and climbed alone over the hills for about four miles east to spy the region over.

It is one wild chaotic upheaval and tumblement of disintegrating coarse granite. Great masses, of irregular size and shape, thrust their heads above the general mass, and stand, split, seamed, creviced, shattered, jagged, and rough and in some cases rounded by water and weather, in dumb protest against the fierceness of the desert sun. This is a part of the Colorado Desert. Yet how different from any ordinary conception that one has of the desert. This range is but one of many such ranges, just as if some Giant Power soaring through the heavens in an air-ship worthy his power had tumbled out, here and there, at his own irresponsible will, a mass of rocks to descend and cover the nakedness and

barrenness below. It is naked and barren, but it is not level and monotonous. It is rugged and uneven, hills and hollows, buttes, ridges, hogbacks, canyons, "draws," slopes, and peaks. There is no order, no system, no clearly defined "backbones." As far as the eye can reach in every direction it is practically the same. There are two exceptions, however. To the west there towers above the near-by ridge the snow-clad jagged summits of San Jacinto. Then as the eye travels a few miles to the south the continuation of the range is seen, with a clean indication of a valley between it and the southern ridge of the range from which we look. This, of course, is the Salton Basin. We should know this anyhow, for yonder is the snow-dotted peak of Santa Rosa, and we know the jagged contour of the San Jacinto range, which appears as if some rude wood-carpenter with the crudest tools had tried to chop its summit to something like uniform height and had made a poor job of it. Here, immediately before me, for I sit facing a trifle west of south, is a break-down in the Cottonwood range, and beyond it the Chocolate range is just beginning to rise in height eastward, so I can see clear through to the sea-level of the desert, and there is the western end of the Salton Sea, some five or six miles of it, embosomed in the heart of the rugged mountains. How blue and smooth it looks! How out of place in this wild, desert setting! How anomalous!—a sea in the desert. Right where I sit I can see the grave of Riley, who perished for want of water. Behind me I could rudely locate the graves — or piles of bones — that tell of scores of men who have died horrible deaths for want of a few spoonfuls of that precious fluid that lies yonder so unconscious and unconcerned in the distance. What a singular thing life is anyhow! Why will men leave the side of the lake? What do they gain by courting death on the desert? What is it in man that thrusts him forth into the most dangerous and inhospitable parts of the earth? Yonder to my right is the Cottonwood oasis. Without the few hundred gallons of water which daily flow into a reservoir built for it, no man could live in this region. Those few drops of water render life possible. Under the shelter of the cottonwoods this morning I heard the cough of a consumptive. Two brothers are there for a short time. They have just

completed the making of a "dry washer," with which they will seek to shake gold out of the gravel they find in some parts of these desert hills. They are here seeking both health and money. A wiser selection of a location for a health-seeker one could scarcely find. Here, away from cities and the crowded, badly ventilated, stuffy haunts of men; away from elaborate cooking which kills far more victims than the disease itself does; sleeping in the sweetest, purest, balmiest, and most healing atmosphere of earth,—an atmosphere that after sundown and before sunrise one can designate only as delicious,—compelling himself to just enough exercise to stimulate heart and lungs to their best action, and thus completely oxygenate the blood,—this is to rationally compel health.



Reaching the desert from Cottonwood Canyon

And if the afflicted of the earth would learn the lesson of wisdom from this man, many of them could win back health and vigor, power and the ability to "do," that give life its zest to the true man.

I spoke of this as "desert," and so it is, and yet, at this season after the winter rains (which, this year, have been more profuse than usual), what a wonderful assortment of floral riches are spread out before me! From my elevated seat on this rugged peak I can scarcely see them. Only the ocatillas in their beautiful new dress of green, which completely hides (at this distance) their cruel thorns, flaunting their scarlet or geranium-colored flower-banners in the air, and the tree yuccas, with the beautiful, graceful, shining-leafed creosote bush, and also, here and there, a dwarf ironwood tree, dot the rocky, gravelly ridges, slopes, and

washes with green. But as you walk it seems that the whole area is one glorious mass of irregularly and carelessly laid-out garden; patches, bunches, beds, whole masses of flaming, gorgeous colors that are exquisitely beautiful, especially when seen in such surroundings.

And I must not forget the birds. I hear them singing all around me. Not a great number, but enough to remove the sense of complete desolation. A few minutes ago a bird flew far away below me, sweetly singing a bubbling melody as he flew. There are doves and quail and a species of swallow and several birds that I cannot distinguish. I have seen this morning two fair-sized birds with yellow bodies and sweet song, two or three tiny birds that I take for canyon wrens and numberless humming-birds.

It was rather late when we left Cottonwood, but we were soon compensated for our delay in the marvelous display of wild flowers presented to us in Pinto Valley. I have fully described this in the chapter on Plant Life. From this valley we ascended to the Brooklyn Mine, which also is fully described in its own place.

We then returned to Cottonwood, and through Crawford Valley to the Brooklyn Mine.

Crawford Valley runs almost east to west. It is practically a trough, though its length is divided by a ridge, with the San Bernardino extension on the south, and the Eagle range on the north. It slopes rapidly (for a valley) from the mountains on either side, and any rain that falls either seeps into the ground with great rapidity or flows to the trough in the center, where a "streak" of trees — ironwood, palo verde, and an occasional mesquite — suggests moisture. Though some parts of it are well flowered, others are almost bare, save for the creosote and a few other of the hardy shrubs and the ever-present ocatilla. There are no trees whatever on the slopes, and this renders the ocatilla with its flaunting and gorgeous flowers the most striking object upon which the eye falls.

The Granite Mine is located in the northwestern end of the Chuckwalla Mountains, in a deep recess or pocket surrounded by majestic granite rocks in every stage of disintegration. Seen

from a distance they are imposing, but when one stands under and near them they loom up portentously and with a grandeur unspeakable. Weather-worn, wind-carved, and sand-sculptured, they impress one not only by their massive size but by the grotesqueness of their shape. Here and there peep-holes and natural bridges have been carved by the elements, and the scenic effects, as one passes behind these apertures gazing out upon the expanse of foot-hill, valley, and distant mountains, are remarkable.

San Jacinto Peak

CHAPTER XXXI

Up Martinez Canyon, into Coahuilla Valley and back by Warner's Ranch and Carrizo Creek

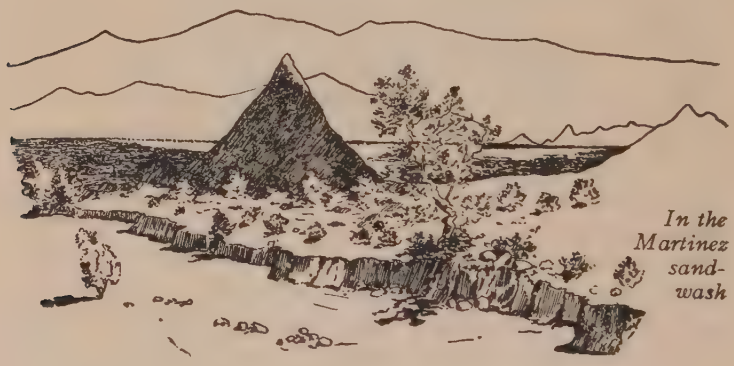
IT is a delicious afternoon in May as we leave our desert headquarters at Mecca. We strike out towards the San Jacinto Mountains on the south. Their beauty and grandeur grow more impressive as the shadows of evening fall upon them, the tops receiving their nightly bath of liquid, rosy light. A wide green wilderness of mesquite lies between the cultivated soil we are leaving and the foot of the mountains, and in this tangle hide the Indian villages of the Torres reservation.

We spend the night near the Martinez schoolhouse, where plows, harrows, and cultivators for the use of the Indians make one feel he would like to be an Indian, for all these are provided for their use by a paternal government. Early the next morning we enter the broad sand-wash that leads into Martinez Canyon, so called from the village we have just left. Gradually the wash narrows and the sand becomes more and more damp until we come to a muddy stream, a few inches wide, which grows larger and clearer the higher we rise. When we reach the rocky slopes it is a good sized creek and soon it develops into a mountain stream, swift and powerful enough to give our burros considerable uneasiness every time we have to cross it. Again and again we cross, climbing higher at each zigzag, until at last we reach a place where the canyon opens out into a little flat where we find a rough stone open-air fireplace. At once we unpack and camp. A geological survey bench-mark tells us the elevation is 2,580 feet. It is an ideal camping place, the murmuring brook close by, and the mouth of a canyon named Tauquitch a few stone-throws away, while in the canyon above there is a veritable tropical

garden of cactus, many of them in full bloom. Here are the ocatillas — St. Joseph's candles — tipped with their carmine flowers in all their gorgeous splendor, while the *Yucca whippleii* and scores of *Opuntias* and *Echinocactuses* with the "candles" add splendor of color and daintiness of design.

The moon rises and adds its mellow light to the charms of this desert and mountain Eden, for, from the ridge near by we see that we are yet quite within the borders of the desert. The mocking-bird sings its notes of overflowing joy and the cicadas drum their cheery notes until long after we are asleep.

While the morning is still crisp and sharp we are up and off, our burros securely packed for the steep climb ahead. We soon



In the Martinez sand-wash

say farewell to the canyon, for our trail sharply turns upon itself, indicating that instead of more crossings of the stream we must now ascend and cross a "hogback." Up we go, higher and higher, and as we ascend the views, both of mountain before us and desert behind, grow more magnificent. We are so near that the desert is absolutely at our feet, and there, spread out beyond, is the dark mirror of the Salton Sea, a rich blue in the early morning light. For a few moments we forget we are in the desert. We are on the mountains overlooking the Pacific near Santa Barbara and this is a stretch of that placid ocean. It cannot be that we are in the desert! Yet farther glances reveal the well-known landmarks and we come back to the fact that the water of the

Salton Sea has transformed the scenery and made a new place of it when we see it from this elevated standpoint.

Soon we are on the summit and there we are favored with a close view of snow-capped San Jacinto peak. The white snow seems almost to swim in the air, so blue is the atmosphere, and so ethereal the blue of the body of the mountain. Only a moment or two are we here, then we dip down again, the trail leading us down the steep mountainside into the gulch below.

Wild cactus on the Martinez trail

What a deceptive thing a mountain trail is! How it plays hide-and-seek with you! Like the thimble of the "thimble-riggers" now you see it and then again you don't. Surely if we knew all about the deities of the Greek mountaineer we should find one especially devoted to mountain trails. He would be a bright, chuckling little fellow, full of fun and frolic and bent on having his humor on prospectors, herdsmen, and other followers of the trail, leading them into all kinds of mazes, then showing glorious vistas ahead, raising hopes and expectations of abundant pasture, easy traveling, cool shades, and the like, only to speedily

dash them to pieces by the stern realities of rough and rugged mountain slopes.

At last, however, we are on the top of an elevated mesa. As we cross it the shadows creep over the table-land. Suddenly, almost in an instant, without any suggestion, a peculiar turn of the trail brings us to the very edge, and, as we look off we cannot keep back the cry of admiration that bursts out at what is spread out before us. It is the desert again, but from this elevation it seems like the level bed of a dry sea reaching up to the feet of the mighty, blue mountains, whose long, massive columns of shadows advance from all directions and slowly descend into

A view of the desert from the ridge above Rock House Canyon

the barren waste. Silent and still the desert lies like a giant monster asleep. Its breath rises as a vapor and hangs over its gray, ominous body. With the sinking sun the mountains take on the hue of purple. The deep gulches, canyons, and recesses change their deep blue until it seems black, and soon the whole range is wrapped in the somber garments of night. The stars begin to shine. A loud cry is answered by an echo several seconds afterwards, and we are about to shout again, when another and fainter echo falls down as a gentle benediction breathed from the very summits of the mountains. Then the moon arises and sleep falls, the bringer of rest and peace.

We are awakened while the stars are still shining by the tinkling of the bell on "Babe's" neck. What is she after? With the

craft and cunning of the burro she seeks, while we sleep, to forage on her own account and get at the sack of oats. But we know it is securely hidden, so we leave her to her own devices and sleep on again.

If our purpose on this trip had been to find the most tortuous stream with the greatest number of awkward crossings, the steepest trails, the roughest paths, verily we have so far succeeded admirably. But we are to have further tests this morning. We descend from the mesa into Rock House Canyon, and on our arrival feel like taking off our hats to our faithful burros. Down the steep and slippery trail, in places seemingly only a few inches wide, where a misstep meant certain death, and where every now and again we either looked in expectation that they would fall, or in horror turned away and waited to hear the crash as they struck the cruel rocks below, — it certainly was a triumph of careful footing when they landed their packs in safety at the bottom.

From above, the valley appeared to be smooth. Now we find it to be the rockiest country we were ever in. Hour after hour we wander along over rocks, around rocks, under rocks, never free from them for a single moment. At noon we reach a deserted Indian *kish*. Where are the owners? We find a collection of ollas partly filled with acorns or water, and there are mortars, pestles, metates, and grinding stones. Outside is a big stone pile or oven (*na-chish-em*), where the squaws have roasted their mescal. This is made from the shoots of the agave, which grows here profusely. There is but one species in this region, the *A. deserti*. Its leaves are densely clustered, thick, and deeply concave, and are from six to twelve inches long. When they first spring up they appear in little round heads or cabbages. Each year the heads enlarge, throwing out fibrous leaves armed with a spine at the point. It takes from ten to twenty years, even in the heated air of the desert, before the period of flowering is reached. Then suddenly a stalk appears from the center of the plant, grows with great rapidity, and is crowned with a long cluster of pale yellow blossoms which hang like beautiful bells, swinging in the breeze.

In the early spring the cabbages begin to be full of sap, and from

the middle of April on the work of preparing the mescal begins. Pits are dug in the earth or sand, lined with rocks and then filled with fire. This is kept up until the rocks are thoroughly heated, when the agave heads are placed in the pit and covered with grass and earth and left to roast for two or three days. When cooked they consist of fibrous layers, sweet and delicious and full of nutrition. The ends of the young shoots also are taken and, after being thoroughly crushed or beaten out on flat rocks, are made into sheets about two and a half feet long and a foot broad, and then roasted in the pits in the same way as the heads. I have eaten the agave prepared both ways and of course the former is much the more tender and nutritious.

A glimpse of the Salton Sea from the Martinez trail

It is no easy matter to keep the trail in a sea of rocks such as we find here. We lose the trail and have to search long before finding it again. The burros, too, are troublesome where a trail is not well defined.

A stone house, the ruins of which we pass, gives this canyon its name, Rock House Canyon. A little brush shack, built close up to a boulder, suggests that the builder had the desire to dwell under the shadow of a "mighty rock in a weary land."

We are aiming for the Indian village of Santa Rosa, perched high on the mountain of the same name. The peak is ever before us, 8,046 feet high, but the cloudbursts and heavy rains have so washed out the trail that in places it has become a deep ditch, and in others has disappeared entirely. Just at this critical

time one of our burros slips and falls. In a moment all hands are at work readjusting the pack. Our map — one of the U. S. Geological Survey sections — is put down in the hurry on a convenient rock. One of the other burros, seeing the map, proceeds forthwith to eat it, and when the pack is replaced we find to our dismay that, just as we need it the most, it has almost entirely gone. As we struggle on we find how great is our loss. Cattle recently have been over the trail and completed the work of obliteration and confusion, so it is not surprising that we miss the trail to Santa Rosa and lose considerable time further on.

But night finds us happy and jolly in a first-class camping place, where, under the shade of a yellow pine, we watch the setting sun as it pours its stream of golden light over the dark green chaparral and the ever-aspiring pines. A pure stream of snow-water from Santa Rosa gives added pleasure, and affords us a good cold bath in the early morning.

The Vandeventer ranch

Soon after starting we find a wagon-road that leads through a long valley from the Garnet Queen Mine to Vandeventer Flat and the ranch of the same name. Here we give the burros a good rest and as fine pasture as the country affords, while we enjoy the hospitality of the jolly owner of the ranch, "Charley" Vandeventer, and a sturdy ranger, Joe Sherman by name. Mr. Vandeventer tells us of the days when the Indians lived by the hundreds in the nearby valleys. But as civilization has crept closer to them they have mostly disappeared, smallpox and consumption having aided the vices of the white man in furthering their annihilation. With fiddle and accordion, tales of mountain lions, wildcats, and skunks, of deer and mountain-sheep, and their destruction by pot-hunters, we pass a pleasant evening, an agreeable change from our ordinary camp-fire evenings.

In the morning we start in a cold dense fog which soon wets

OAK GROVE RANCH-HOUSE, ONCE A STAGE-STATION

us to the skin from top to toe. We have to cross several creeks, so we wade right along. Down we descend, a thousand feet, into the Coahuilla Valley. It is a long, broad valley in which many hundreds of cattle are grazing on the rich feed, and they watch us with that never-quenched look of surprise as we pass along. At last we are walking in a lane between two barbed-wire fences, which denote the boundaries of a ranch owned by two negroes, the brothers Hamilton, who are reported the owners of fine land and much stock.

We turn to the north and find ourselves in Durazno Valley, — the valley of the peach, — in which many Indians live. Beyond the Indians' *kishes* is the Clarke ranch where we are heartily welcomed by our old friend, Hardy, a prospector and miner,

The main street at Agua Caliente, Warner's Ranch

who, in the old days, used to drive stage from Tucson to Yuma and San Diego. While we dry our clothes — robed in a blanket and a smile the while — he prepares a hearty and tasty supper, to which we do full justice in our negligee costumes.

Clarke and Hardy have found this a great bee country. They have over three hundred stands, and the honey is rich and of delicate flavor and therefore commands a high price.

Our start next morning is in distinct contrast to that of yesterday morning, for the sun shines bright and clear through an atmosphere as healthful and bracing as one could desire. We pass through valleys and over hills, and through dense masses of chaparral into Oak Grove Valley where waving fields of barley and oats give evidence of well-cultivated and fertile soil. Very interesting is the long, low building shadowed by hoary live-oak trees. It is the Wentworth ranch-house, where the soldiers of the Army of the West rested on their journey from Santa Fé to

the conquest of California. Later it became a stage-station, wayside inn, posting place, and hospital where those who had broken down in crossing the weary stretches of the desert could stop and recuperate. And as we sit we see a picture which was made here not long ago. It is of the evicted Indians of Warner's Ranch, on their way to their new home at Pala, as wicked and monstrous an eviction, even though sanctioned by the United States Supreme Court, as ever occurred in history, only relieved by the fact that Commissioner W. A. Jones obtained from Congress a grant of $100,000 to secure for the poor homeless ones a new home.

Old stage-station at Warner

What a glorious vista these old oaks make as we journey on to Warner's Ranch! Thousands and thousands of fat cattle roam the great ranch, now a veritable paradise for cattle after the copious rains of spring. At length, as we are growing weary, we spy the adobe houses of the village of Agua Caliente (from which the Indians were evicted), we pass the forlorn and deserted church in which, in happier days, we have worshiped with the Indians. It is now in use as a hay barn. The houses have all been renovated and white people are occupying the homes in which we have visited our Indian friends many a time. The whites have come to rest and recuperate and use the baths of hot water from which the village obtained its Spanish and Indian names, respectively *Agua Caliente* and *Palatingwa*. The water, at a temperature of about 160° Fahrenheit, bubbles out from between the rocks a short distance above the village.

San Felipe River

Here is the road leading over to the old Warner ranch-house,

three miles away. This is one of the best-known and historic spots of early-day California. For many years it was the mecca of all comers to the Golden State by way of Yuma, even the stage road to Los Angeles passing this way. It was the first real valley of plenty after the sandy wastes of Texas, New Mexico, Nevada, and Arizona, and here travelers could stop and recuperate their own exhausted energies and those of their beasts.

Warner received the ranch as a grant from the Mexican government, and had been long in possession when Kearney passed through in 1846. For many years the Indians gave him no trouble, but in 1857 a hostile band of three hundred Coahuillas attacked him at his ranch. Having received warning of the expected raid he had removed his family, but personally remained to give the Indians a warm reception. He had several horses

Ruins of Carrizo stage-station

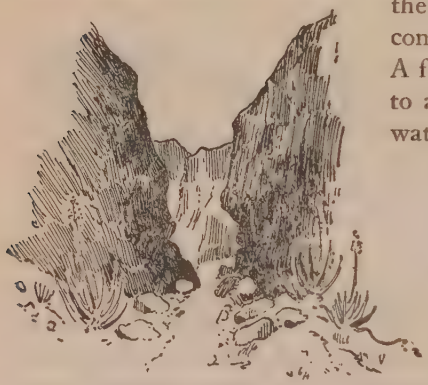
saddled and ready for instant flight, and loaded weapons prepared to ward off the attack. When the Indians came he stepped to the rear to gain his horses, and found them all gone but one, and an Indian untying that. As he appeared a shower of arrows fell around him, but he succeeded in shooting the thieving Indian and three others. In the confusion that followed he was able to get away, taking with him on the same horse a crippled mulatto boy who had been sent by a friend to regain health from the hot springs. At Santa Isabel he found his vaqueros, and heading them, returned to see if the Indians could be checked in their work of devastation. But his men were not to be relied upon, so Warner was compelled to abandon his store, in which he had six thousand dollars' worth of merchandise, and retire to San Diego.

It is now the intention to make a popular resort of the Hot Springs, and already steps are taken to that end

We now enter the San Felipe Valley, which in shape appears to be something like a triangle with blunted vertices. The long side is toward the desert and at its end is the broad expanse of the San Felipe ranch. The old adobe stage-station has disappeared and in its place a modern ranch-house stands. About three miles away the San Felipe Creek, or river, has its rise. It flows between narrow walls for a distance of about eight miles, and is then swallowed up by the heated sands of the desert. The road seems to be endless to our gaze. It stretches on and on, now rising, now sinking, now crowded by hills, then opening out wide, but we see no pass. The road is cut across by many *barrancas*, deep gullies washed out by the heavy rains, and they compel us to take many extra steps to go around them.

At Vallecita the ruins of the old stage-station remind us again of the days when this was a transcontinental highway of travel. A few yards farther on we come to a trough filled with running water. A painted sign reads:

"THIS WATER IS FREE.
OTHERS ARE KIND TO YOU,
BE KIND THEN TO OTHERS
BEHIND YOU.
LEAVE THIS TROUGH
FULL."



General Cooke's Pass

Anxious to push ahead we water our burros, fill our canteens and follow the sand-wash until the setting sun calls us to a halt. So we stop and make a "dry" camp. Next morning the air feels sultry and oppressive and it doubtless makes the sidewinder (*Crotalus cerastes*), which we catch sight of within six inches of the trail, too drowsy to resent our presence. We kill him, not because he injures us, but on the broad general principle that it is well to reduce the number of such venomous reptiles, and pass on to Palm Springs. This is not *our* Palm Springs, but a namesake which has no palms and very little water. Had we

kept the road we might have gone by without noticing it, but the deep washouts caused by the rain compel us to take higher ground where we see the road leading over the hill to the spring. It is a spot of fresh green amongst mesquite and arrow-weed, wrested from the alkali and made into an alfalfa patch. There is a little orchard of peach trees, a row of grape-vines, a little barley field, a few chicken houses, and a tent all sheltered by a three-cornered limestone peak. The owner is a kind-faced, sturdy German who tries to make a living where Nature is not kindly disposed to his efforts. When he came to take it up as a homestead he had two good horses and a new Studebaker wagon. One of his horses fell and cut his flanks open on cruel and jagged rocks. He recovered only to die of starvation, for there was not enough pasturage to keep the animals alive. The owner planted barley and it came up well, but he was compelled to go to the nearest ranch to find feed for the immediate needs of his animals. Imagine his feelings on his return to discover what seemed to be all the wild and stray burros of the desert in his barley, and not a single stem left standing. They had cleaned it off clear to the ground, and he was helpless, for even in anger one could scarcely condemn the burros.

We follow down the sand-wash until the dark green of the carrizo, or reed, appears, and we know we are on Carrizo Creek. The road skirts a hill, and on its crest we find a sign that reads "104 miles to Yuma, 39 miles to water." We are at the old stage-station. There is only a small part of one wall left. Everything else has gone. Mosquitoes pester us, and horseflies torment the burros, and the discomfort is kept up after we are in our blankets, so that we do not sleep as well as usual, until a cold breeze toward morning drives them away. We need not have been surprised to find, on awakening, that our burros were gone. It takes one of us four hours to trail and bring them back, so that breakfast is later than usual. As we roll up our blankets a full-grown scorpion crawls from under them, the first and only occurrence of the kind for many long months.

It does not take us long to leave Carrizo Creek, and now we are again in the desert proper. Since we left San Felipe Valley we have practically traversed nothing but desert, but it was not like

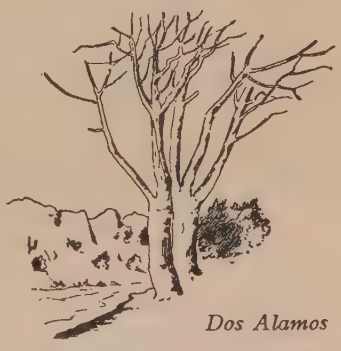
this. Here it is the real thing, stretching out in barren gauntness, shimmering and glowing in the fierce rays of the sun.

Soon the desert greets us, in her warm and unmistakable fashion, with a sand-storm. This is bad, for in the direction we are going it is nearly fifty miles to water. We let our burros drink their fill, and poured into our three canteens every drop they would hold before leaving Carrizo, but we did not figure on a sand-storm which will make burros and ourselves extra thirsty. We only hope it will not obliterate our landmarks. Fortunately it soon blows over. The wagon-road makes a wide detour and one of us — the tenderfoot — suggests that we "cut across." We are willing to give him the experience, yet, afterwards, we wish we had kept the road. For as we cross the open country we find it honeycombed with squirrel and other holes and so washed out that the burros are afraid to tread lest they sink in and fall. Several times this happens, so that all our urgings fail to make them go any quicker than their cautious natures allow. The night comes and we are still "cutting across," so we make a dry camp in the hope of doing better to-morrow.

Sand sculptures on the desert

When morning dawns we start along, not much more briskly than yesterday, for the country is still unsafe for quick traveling and our burros are very tired. Yet we find a compensation in the color displays the desert makes for our gratification. The plain appears to be of purple, carmine, and golden-fire. Brightly colored hills rise before us and glorify the barren path we must take. Even the wearisome sand is painted in most glowing colors. Now we come to a space studded with irregular pebbles from the size of a walnut to larger than a hen's egg. Every color in nature is here represented in stone. There are red, gray, and mottled granite pebbles, jaspers, green serpentine, chalcedony, agate, hyalite, gneiss, gypsum, fluor-spar, obsidian, and many other hard stones and semi-precious gems. Though

pleasing to the eye this area is exceedingly hard to walk on and our poor burros find it as painful and difficult as we do ourselves. A little farther on are a number of dumb-bell forms and then we come to a limestone formation looking like white cauliflowers, which tells us that here is the limit of the prehistoric fresh-water lake elsewhere fully described. Several hours are taken to cross this field of wonders and then, suddenly, we find ourselves on the edge of a deep *barranca* with precipitous sides down which there is no possibility of descent. It takes us a long time to find even a passable way to get down and an equally long time to get out. Then, to our intense disgust and greater weariness, we discover that we are in a stretch of *barrancas*. Some of them are thirty feet deep and twice that in width. The sweet-sounding Spanish name does not take off one particle of the disgust or the weariness. One goes ahead to hunt out the best passageway and the other follows with the burros. We are about to give up for the day and make camp when a glad shout announces that the wagon-road is again found. That part of our journey is at an end and almost before we are aware we are gazing upon the blue waters of the Salton Sea, rippled by the winds of the late afternoon. Before making camp we slay another sidewinder, and moving on to a far enough distance for at least half-forgetfulness make camp. The burros enjoy the water inside and out as much as we do. We strip and take a swim, and how delicious it is after our long and waterless journey! Stretched out in our blankets we enjoy the setting of the sun and the rising of the moon, shedding its primrose light over the gently dancing waves. The noise from these lulls us to sleep better than the sweetest music.



Dos Alamos

Refreshed and renewed we take the wagon-road in the morning, and as we skirt the mountain's point look up to the old beach which, clear and distinct, lines the mountain above us. As we

gaze upon it and then look toward the desert sea we cannot help the queries which force themselves upon us as we think how it has slowly crept up, inch by inch, during the past months: "Will this new sea take the place of the old? If so what will become of the works of man in this valley?" Fortunately we are not required to give an immediate answer. Our hope is strong that the work now being done to prevent the further rise of the sea will be successful.

Soon we pass the little alkali springs called Fish Springs. The sea had quenched our thirst, or how glad we should be to drink of these bitter and salty waters. This used to be the first water after leaving Carrizo, and many a man has thanked God even for so poor a supply of so poor a quality, for without it he most assuredly would have died.

Eight miles farther and we are at Fig Tree John's. Rude fences appear and an Indian *kish*. A post bears a written notice under glass and framed, the ink now almost washed out by the rains:

"This ranch belongs to Juan Jack Bonito, and has been owned by his ancestors for many years.

(Signed) Juan Jack Bonito,
January, 1901."

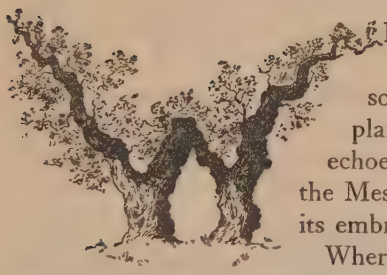
Juan is shrewd. He has a son who is well educated, and the two have decided that it is far better to forestall the selfish white man than fight him when he has filed on and taken possession of their land.

White rumor does not speak kindly of John, but everybody knows that Rumor is a slanderer and liar. It says that he has robbed emigrants of their horses and provisions, and even their lives have been charged up to him. The only foundation for these unjust and cruel charges is that he has cared for (and perhaps used) the animals of desert parties that have strayed away and come to his place for food and water.

Just two weeks from the time we started the cottonwoods of Mecca appear in sight, and though tired and weary after our tramp we are richer in desert knowledge and experiences.

CHAPTER XXXII

Through Mesquite Land



WHEN spring comes and the happy note of the quail resounds in the valley, and the low, plaintive call of the wild dove is echoed from tree to tree, the Land of the Mesquite calls and we long to be in its embrace.

Where is this Mesquite Land, and what constitutes its charm? It is hard to tell to another the subtle sensations that compel one to affection, yet it seems that no one could see Mesquite Land in spring and not be enchanted by it. It is not a large country. It is merely the name we have given to that part of the Coachella Valley in the Colorado Desert that lies near the base of the Sierra San Jacinto. Properly the name might cover an immense region where the mesquite abounds, reaching south to the mouth of the Colorado River, north to the center of Nevada, and east into Apache Land.

In the very heart of Mesquite Land are the Indian villages of Torres, Martinez, Agua Dulce, and Alamos Bonitos. Many a mile have we tramped to and fro among the *kishes* and *samats* of these people. Torres is completely hidden in a dense thicket of mesquites. A lane of sturdy old trees, massive and gnarled like veteran oaks, leads us to a little adobe hut. We almost pass by ere we notice the form of a man inside, lying on the ground, a woman sitting by his side. We have come to the death-bed of one of the oldest of the Torres Indians, one who for many years has been chief of his people. The dying man speaks a little English, and as soon as he feels our sincere sympathy he opens his heart and speaks with touching sadness of his life. He tells of his people's coming here, in the long ago, and how, ever

since he can remember, he has helped their descendants in their sickness and want, and rejoiced with them in their joys. "But now," he bursts forth, "all of them have left me, all! all! All have left me to die alone! Only my poor old wife remains with me. When I am dead they will cry and wail, but what will it matter?"

A week later a funeral takes place, and a sad old woman remains alone. There is a large funeral. Indians come from all parts of Mesquite Land and there is much show of lamenting and woe, but "what does it matter?"

Many deeply worn trails lead us from one mesquite thicket to another, and many a mile of fence is built by the Indians from its trunks and branches. The framework of many a *samat* is

Near Indian Well

constructed of it, so that it affords homes and shelter against the sun and rain. In scores of places there is no pretense at building a framework. The tree is taken as it stands, the lower limbs lopped off to suit the convenience of the family, a few additional posts put in and the spaces filled up with brush, tules, arrow-weed, and willows, and thus a primitive and reasonably permanent home is made.

Leaving Indio we are soon on the sandy road leading to Palm Springs. The feet of men and animals sink deeply and walking is hard. To the right and left of us are immense sand-dunes, looking like the white graves of men's ambitions. Here and there are mesquites completely buried in the sand, which has blown and drifted around them until nothing but the new shoots appear. To see these great balls of sand rise from the desert floor, bursting into rich foliage, is one of the always delightful surprises of the desert.

Here and there our eyes fall upon pieces of broken pottery, and the farther we go the more we see. If the casual traveler should become interested and seek more he might make a rich strike and find a whole bowl or olla buried in the sand long ago and now uncovered by the winds. Or he will probably pick up a few arrow-heads made of flint or obsidian, clearly telling of the days when the Indians hunted the deer, antelope, mountain-sheep and other game in Mesquite Land with their primitive bows and arrows.

Here we are at Indian Well. It is a square, boarded-up well, with rope and buckets all complete, standing as one of the old landmarks on the old desert road, surrounded by hills covered with green mesquite.

In Cathedral Canyon

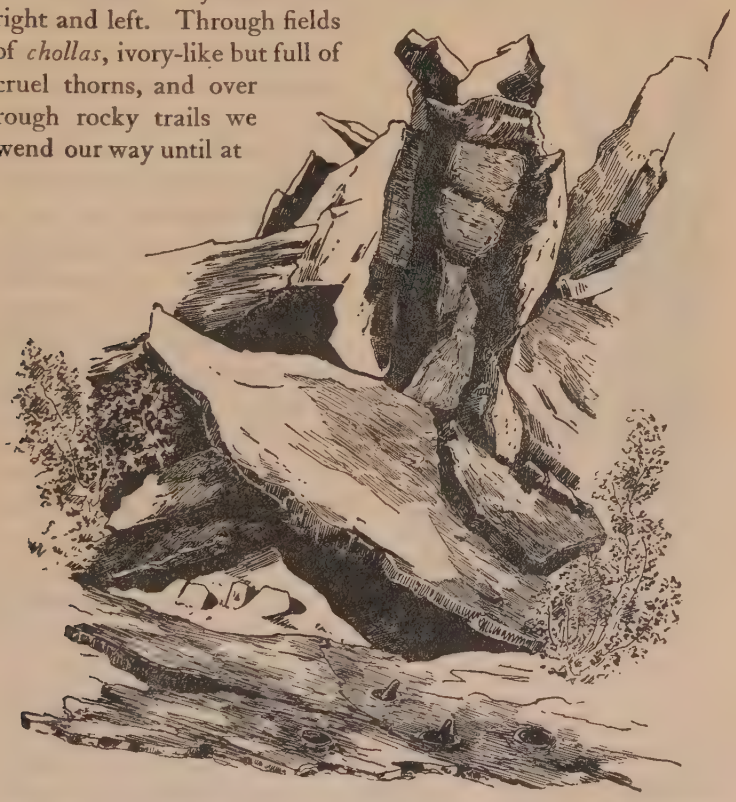
Back of the road, on the south, a rotunda of saw-toothed mountains beckons to us. An old Indian had told us that there are caves in these low mountains in which the skeletons of men and women are to be found and that a great Indian village used to lie between them and the water of the prehistoric inland sea. We hunt around but can find neither caves nor skeletons. Only the broken pottery and arrow-heads speak of occupation in the past. The Indians believe the whole region to be haunted. They claim that in the night-time if a man dares to walk here a peculiar light will follow him, and he will hear voices singing and talking, but no human presence can be discovered. It is a lonely region and when night falls upon us, in spite of our disbelief in the stories of the Indians, we cannot deny that we are impressed by the spirit of loneliness which seems to possess it. Even the well, standing on the roadside, ready to cheer

man and beast with its vivifying water, takes on the appearance of a scaffold, and we shudder in spite of ourselves.

When our camp-fire is lit and the brilliant gleams shoot out into the gloom we begin to feel more cheery. What scores of meetings have taken place at this old well! Prospector has met home-seeker, and miner has greeted cattle-man, the one going "inside" for a vacation, the other coming into the desert to find a place whereon to settle. Nomad here meets nomad, and around the camp-fire, with pipe alight, questions are asked and answered which make the next day's travel less uncertain and wearisome.

The night passes, we sleep the sleep of the tired and healthy, and when the new morning dawns we forget all sadness, all gloom, and push cheerfully on our way to Deep Canyon. Out of the gray desert rise the white sand-dunes, made cheerful by persistently green mesquites, and erelong we enter a lane lined on both sides with the thorny trees and completely arched over, so that for a few minutes it seems a joke to speak of being on the desert. We are in a fairy bower of exquisite grace and delicate beauty, for there is no tree that has more beautiful leaves than the mesquite, and as they stand out against the clear sky they seem like the delicate tracings of some new and rich pattern of lace. When we emerge the monotonous range of mountains is before us, the outlines seeming to repeat themselves again and again. Here are numbers of long spurs thrust out into the desert making an equal number of "bays," and into one of these we enter, this being the large mouth of the narrow canyon we seek. We travel several weary miles through yielding sand where there is no sign of verdure, ere there is any suggestion offered of the beautiful mysteries that are in store for us. A bluish rosy light now envelops the inner circle of the mountains which here assume distinct and particularly picturesque forms. There are high peaks and the rich purple and vividly black shadows that tell of deep canyon recesses. Slowly the sandy and barren waste gives place to a growth of plant life, and the shrubs and trees take on richer and deeper greens as we travel along. Hitherto there has been no sign of water, but, suddenly, the burros prick up their ears and push eagerly along. They hear the sound of water, and

it is an incitement to rapid travel that no stick or human persuasion can equal. We are soon by the side of a little stream which emerges from the canyon before us. Crossing and recrossing, it increases in volume the higher we advance. Now we are actually in the canyon and the stream grows as the waters pour in from side canyons to the right and left. Through fields of *chollas*, ivory-like but full of cruel thorns, and over rough rocky trails we wend our way until at



Cave-dwelling of Indians, Andreas Canyon

last we stop at the very gate of Deep Canyon itself. Here we unpack our burros and after lunch take time to admire the wonderful gateway before us. To the left the mountain wall stands almost perpendicular to a height of several hundred feet. The rocks of which it is formed are twisted all out of their original

stratified condition. They are flexed and curved and then set upon edge again, making folds as wonderful as the great Wheeler fold of the Grand Canyon of the Colorado River. What mighty upheavals or slow, resistless molding of the rocks this region has been subject to!

No need to urge us to face the difficulties of this canyon. We are eager to see more. So, after we are well rested, we start on, leaving our burros behind.

In Chapel Canyon

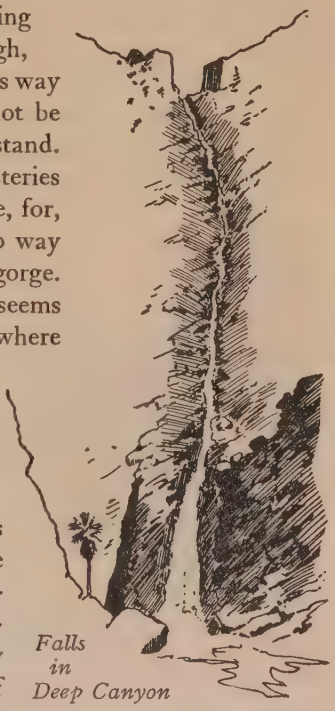
And the canyon itself! Who can describe it? A few hours ago we were on the barren, dry, featureless sands of the desert. Now we are between walls fully a thousand feet high, wrinkled and scarred with deep gashes, where a roaring stream pours down its waters with a life and sparkle that three hours ago would have seemed impossible and incredible. High up on the walls clusters of green appear against the pure turquoise of the sky. What are those suspended pictures, hanging in weird, mysterious beauty in this hidden desert canyon?

A fresh glimpse as we come to a new angle reveals them as palms! Giant palms either climbing out of the canyon to get more into the sunlight, or seeking to reach the water below. How do they sustain life up there? Are water and soil upon those rocky shelves? There must be something to feed the desert giants, for they are healthy, strong, and vigorous.

Now as we progress it is one constant crossing and recrossing of the madly dashing torrent, which rushes over rocks, and rolls the boulders along and then springs gleefully down the cascades into glistening and sparkling pools. Here we are on a narrow ledge of rock twenty feet high. The foothold is slender and

precarious, but it is all there is, so we hold our breath and walk carefully along. We make it in safety and are soon crossing the stream again, springing from rock to rock where a mis-step would give us a sudden bath and perhaps a rough shake up in the swiftly running water.

Another climb and we are standing before a cascade, about thirty feet high, which, like a corkscrew, has bored its way into the rock so that its course cannot be followed by the eye from where we stand. Nature here seems to guard her mysteries of grace and beauty with jealous care, for, on our first glances, we can find no way to progress farther in this narrow gorge. The walls are almost vertical, and it seems hopeless to expect to find any place where they can be scaled to pass this waterfall. But our wills as well as our bodies are strong, and we hunt until we find a precarious foot-path up which we ascend.



Falls in Deep Canyon

The dash and roar of the water is ever in our ears, but suddenly, as we make a sharp turn, a new and dominant voice greets us, more powerful than the many-voiced and noisy stream at our feet. A thin film of spray, too, floats like diamond mist in our faces, and we hurry forward to see what we are to see. Another corner, and behold, a wonder of glory and beauty is before us! On the right stands a stately palm, and on the left, from the height of about sixty feet, a silvery spray of dancing and falling water-pearls rains down upon smoothly polished rocks and then leaps off on to the palm and the boulders beneath. We are hushed into silence. In the presence of such Beauty man should be reverent. The glistening sun kisses the mist into a rosy blush, and we see a fairy dance of sparkling gems assuming every curve and sweep that grace and beauty could desire.

This is not all! Filled with the tender exquisiteness of it and gazing as if we could never be filled, suddenly a companion points in another direction. Gazing thitherward we see a stream of water falling from the dizzy heights above, — a waterfall a thousand feet in height. In a moment the name "Yosemite!" flashes into the mind. It is only a memory, not a comparison, for the silvery thread here cannot be compared with the volume of water that thunders down in the great valley, but here, as there, the water brings its message of Life and Beauty from the high mountain peaks beyond to the desert valley below. In the Yosemite, however, the dark green of the foliage and the purity of the granite are enfolded in a veil of blue atmosphere that enhances their exquisiteness, while here the rocks are grim, twisted, somber, and barren. The dry atmosphere of the desert wavers over the canyon and shows forth the nakedness of the rocks instead of veiling them, and the only verdure is found in the few cottonwoods, elderberries, and ash and the spined cactus of many species. Yet, in its way, it is as grand and sublime as is the Yosemite, and as well worth an arduous journey to see.

Large falls in Deep Canyon

We gaze, not our fill, but until we feel we must press forward, and soon come in sight of a deep gash in the main wall of the canyon. There must be something there worth seeing. A hard climb up the wall and down on the other side brings us to the foot of two low falls. They are beautiful, but tame after the scene we have just left. These falls are hemmed in by high boulders which completely block the canyon. We seek an outlet, but there is none. In vain we follow this suggestion of a way over, and then that. The boulders are worn so smooth by the falling waters of many centuries that they afford no foot nor hand hold. We long for a scaling ladder, for who knows what there is beyond? What possibilities of scenic grandeurs hang amongst those unscaled

cliffs ahead of us? We envy several majestic palms which stand on the rocks four hundred feet above. They may be gazing upon scenes that we should be entranced to witness.

With regret we retrace our steps, but at our camp-fire at night, out again on the sand, we recall every detail of all we saw, and thus live again the breathless moments when we first gazed upon these hitherto unknown glories. And when the last glow of the fire dies down, and we roll ourselves up in our blankets, and the stars of the desert sky make their silent way through the firmament, it is to dream and visit again the rising cliffs and yawning precipices, the cascades and waterfalls, watched over by the steadfast sentinel palms of the Yosemite of the Colorado Desert.

This year, 1905–6, has been a great year for water in the desert

Chollas on desert

canyons, hence we have seen Deep Canyon at its best. Will it be the same in drier years, or after several dry years, in succession? Who can tell? The desert canyons have their secrets which man as yet has not discovered.

Next morning we continue northward, skirting the spurs and entering the bays of the range one after another. After ten miles of travel on the road we again turn off and enter an alley of rocks which winds along until it brings us to a full stop before a bluish gray wall. At its base, in a little niche, is a tiny spring where humming-birds, bees, butterflies, larks, mocking-birds, and robins quench their thirst. We also see that the coyote, the mountain-sheep and the lynx often use it as their watering place, and there are evidences that the coyote and lynx have waited here in hiding, ready to spring upon their unsuspecting and innocent prey.

Close by, a palm tree offers its shade to the burros while we

climb up a series of wild, rocky steps, made by Nature, into a small rocky rotunda. From here a second flight leads us to the second floor of what seems to be a native cathedral. Its floor is about fifty feet in width, and all around in its walls are niches for the figures of the saints. Here, "the world forgetting and by the world forgot," one may worship in one of God's own temples. Higher up we climb, and from a more elevated platform look down upon the pathway that led us to the cathedral. The palm stands like a reverent onlooker gazing up at the ecclesiastical building and showing the way hither. Beyond is the desert of gleaming sand framed on its northern shore by the faint blue outlines of the San Bernardino range.

Another day and we reach Palm Valley, which to the east and north is open to the desert, while to the west it lies under the immediate protection of the high mountain walls of San Jacinto. To the south, also, stretch the lower walls of the same range. In the days of the Southern California boom in 1885 this valley attracted speculators, who, enthused by its charm, laid plans for the erection of a desert city. They named it Palmdale. Its site was seven miles from the nearest station on the main line of the Southern Pacific railway, and, to provide easy transit to and fro, they laid tracks for a horse-car line to connect their new settlement with the railway. Work in the development of the city was begun, grapes and orchards planted out, when suddenly the water failed, and the beautiful dream of the speculators vanished. In spite of total neglect the vines and trees are still alive, but few indeed are the human feet that ever tread where once many men were so busy and so sanguine. The car track is half buried in the sand, and stranded midway between the deserted city and the station, just as it was left when the mules were unhitched years ago, battered, bleached, and beaten by the storms, sun, and sand, stands the old tram-car, half covered with sand, a type of human failure and defeat.

A few miles farther and we reach the Garden of Eden where Mr. B. B. Barney of Riverside, California, has brought an abundant supply of water, planted many palms, and started his Edenic garden, and then left it to revert to its original wildness. Here we camp awhile on the outskirts of the Mesquite Land that we have so inadequately described.

CHAPTER XXXIII

From Pines to Palms

PIROUETTING like so many clowns and acrobats are the sparks that shoot out from our camp-fire. The flames dance and circle merrily and the burning mesquite wood crackles lustily. It is a beautiful evening in February and we are camped near the old town of San Jacinto on the west side of the great range of that name, the other sides of which gaze directly down upon the desert. The morning of the start is clear, bracing, and inspiring, and it seems a short tramp past the home of Mrs. Jordan, the Aunt Ri of "Ramona," to Florida and thence up the steep grades of the mountain to the pines.

But evening overtakes us. We make camp under the long-spreading branches of a big-cone spruce (*Pseudotsuga macrocarpa*). All around us is a dense growth of chaparral, the main feature of which is chamisal (*Adenostema fasciculatum*), with several species of manzanita (*Arctostaphylos*), ceanothus, mountain-mahogany (*Cercocarpus betulæfolius*), and tree-poppy (*Dendromecon rigidum*) scattered throughout the mass. It is early and we determine to have a luxurious bed, so we gather a large pile of spruce branches and make a mattress of them on which we spread our blankets. Then in this sweetly odoriferous and soothing atmosphere, lulled by the wooing winds which kiss the pines and make them sing, we sink into a sleep, dreamless and reposeful, that few city dwellers ever enjoy.

In the morning it is hard work not to spend all the time in botanizing. The spring flowers are coming up in unusual profusion. Yonder is the big-root (*Echinocystis macrocarpa*), and as only one of us is familiar with the plant and the reason for its name, we stop long enough to dig it up. It is one of the most

wonderful water-storage plants of the mountains, being to the higher regions what the barrel-cactus is to the desert. Its root is made for water storage, and we find that the specimen we have dug is gorged for a long, dry summer. It is as large around as a man's body and full of water.

Soon we pass a lumber camp, one of those relentless slaughter-houses of trees that have taken years to grow, and that ruthlessly denude the mountain slopes of their rich clothing of pines, firs, and spruces. We recognize the need of lumber, but we are bitterly opposed to the present methods of cutting it which take no thought for the morrow, stripping vast areas and never planting a seed for the future.

Allan's Camp, a picturesque summer resort, now seems desolate and forlorn. Its tents are all dismantled, but when the

The Thomas ranch among the pines

warmer days come the merry crowd of campers will come also, and then the woods will resound with happy voices, exuberant laughter, and the songs of men and women to whom the mountains have given new life, health, and strength.

Now we are fairly in the Hemet or Thomas Valley, the former name being given because on our right is the great Hemet Lake, caused by the Hemet Dam, and which supplies the town and vicinity of Hemet with water, and the latter name being that of our old friend Thomas, after whom the mountain yonder is named and to whose hospitable ranch-house our willing footsteps are fast hastening us.

What a difference it makes when one is tired and hungry to feel that there is a glad welcome awaiting him ahead, where willing hands will minister to his comfort and cheerful voices and happy smiles make him feel at home! This is the Thomas

habit. Many a traveler can tell of the warm-hearted hospitality of this whole family, from father to youngest son, from mother to youngest daughter.

As soon as we appear kind words greet us and we are bidden to enter with the courtesy of New England combined with the hearty and spontaneous welcome of California. Mr. Thomas left the East when a young man, sailing for the land of gold in the early days of the excitement. Soon he drifted from San Francisco to Santa Barbara, where he met his fate. The smiling eyes of a warm-hearted señorita made him captive, and he abandoned the gold-fields for a happy married life with the woman of his choice. An Indian guided him to this valley of green pastures in the heart of the mountain, the pine trees allured him and so here he established his ranch, stocking it with horses and cattle, and conducting it in a manner that for years has made it one of the model ranches of Southern California. A large family of boys and girls came to bless the happy couple, but now they are all grown up and scattered save one, the youngest daughter, her father's pride and joy. He says she is "his lady, cowboy, musician, and cook." Happy the father with such a daughter, and blessed the daughter with such a father.

This ranch-house has seen not a few noted literary people. Here Helen Hunt Jackson rested while on her tours of investigation of the condition of the Indians of Southern California, and many another has come to hear from the kind-hearted lady of the house stories of the early days "before the gringo came."

It is with the regret we always feel that we leave this hospitable home and tramp along through the rich pasture dotted here and there with pines. There are five meadow-valleys like this on Mount San Jacinto, but this is by far the largest and most important. It has an average altitude of four thousand four hundred feet and includes about two thousand acres, all of which is available for pasture. The water supply comes on the north from a high ridge that is an offshoot from Tauquitch Peak, and on the south from the Thomas Mountain. The meadows contain a large amount of wire-grass (*Juncus mexicanus*) and also such grasses as *Agropyron caninum*, *Elymus triticoides*, and *Polypogon monspeliensis*. How the cattle can eat grasses with

such ponderous names and not suffer internally is a mystery, yet they seem to thrive abundantly.

An all-day's tramp is ahead of us. Clouds gather and rain begins to fall, however, before we reach the welcome shelter of the Vandeventer ranch, where kind hospitality always greets us.

It is a bright sunshiny morning that invigorates and stimulates us as we leave Vandeventer's and, swinging sharply around to the left, take the trail that leads us northeast to the desert. Hitherto we have been traveling southwest. Vandeventer's is the apex of the triangle, and we have to journey in as straight a line as mountain valleys and canyons will allow us to Palm Springs, where, if one were to draw a line across to our starting point at San Jacinto, we should find the west corner of the base line of our irregular triangle.

The trail is kindly towards us. In the main it is good, and from an elevation of 4,549 feet at the point where we leave the wagon-road it gently descends to 3,500 feet and then 2,500 in Little Paradise Valley. Now we come to the flats adorned with cottonwoods and mesquites, these latter telling us that we are once again in the actual desert zone. And how fascinating it is to study the plant growth of the various altitudes and the different zones! We have done this for years in a desultory way, but Professor H. M. Hall, of the Botanical Department of the California State University, has done it scientifically and his monograph on the subject should be in the hands of every man who makes such a trip as this. He shows that the ordinary conditions of altitude which generally affect plant growth are materially modified here by unusual conditions, such as steepness of slope, the desert winds, avalanches, and landslides, etc.

The effect of air-currents on the plant-life of San Jacinto is peculiarly interesting. On the west and southwest the breezes are the ordinary warm currents which tend to exalt the zones of plant-life to the higher summits. On the east and northeast, where naturally one expects to find these zones differing on account of the cold winds that generally come from these quarters, the very opposite occurs. For here come up the torrid winds from the desert, forcing plant-life up, far above what we find on the west and southwest.

In some places a fierce battle is constantly being waged between opposing factors which control plant distribution. One

Murray Butte, in Palm Canyon

of these is on the north side of the mountain, where, as Dr. Hall says, "on account of the steep north slopes, we should expect to see the life zones running down to very low altitudes. But

opposed to this factor is that of the warm air-currents rising from the Colorado Desert. The lower edge of the timber belt, which furnishes a good indication of the results of the struggle, is seen to be extremely sinuous on these slopes, running well out on the protected sides of all ridges and spurs, but immediately retreating to higher altitudes wherever it comes around on those sides exposed to the desert winds. This would seem to indicate that the lower limits of this belt are influenced not so much by the slowly ascending air-currents as by the hot winds, since the former would tend to equalize the temperature over all that

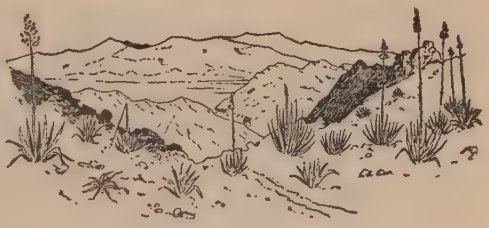
On the Palm Canyon trail

region, while the latter strike as hot, drying blasts on all exposed areas."

With discussions such as these, elicited by the varying conditions as we journey, we while away the hours. Here we rise upon a ridge, and again make a quick drop of two hundred feet or more. From the ridge we look down, and there, calm, stately, and serene, we see the first group of palms. This is the outpost, the advance guard. Higher than this they have not yet been able to come in their storming of the mountain heights. What a wonderfully interesting subject it is, this influence of altitude and climate upon the growth of plant-life! Hitherto we have been in the pines, spruces, and firs. Now we are to be with the palms, with but few of the arctic species. Yet,

while we love the palms, it is with a decided feeling of regret that we gaze upon our last group of pines. There they stand, the stately trees, in a most alluring cluster, — an island of green projected, as we look up to them from below, upon the deep cobalt of the mountain sky, — and as the clear and brilliant Californian sunshine sweeps through their leafy aisles, suffusing the whole palpitating cluster with its searching and resistless radiance, the very air seems filled with the aroma of creation and life.

Now the trail swerves to the right. From all sides the mountain seems to dip towards the canyon (for we are now at the head of Palm Canyon), and also northwards towards the desert, a white sheet of level sand (so it appears) bordered by the blue line of the San Bernardino Mountains. Here is a large garden of *Yucca whippleii*, and it seems as if we might have them all the way down to the desert, but they disappear almost as suddenly as they appear, and we see them no more.



On the trail up Palm Canyon

Now the palm trees are more frequent. One after another, individually and in clusters, they come into sight, their tall, slender boles lifting high their golden tops, crowned with green fan-leaves and looking almost like the head-gear of Indian warriors. In this canyon and at this time, they present a grand and almost awe-inspiring aspect and we are hushed into silence and delighted adoration in their presence. Down and down we go, the merry stream singing to us all the way.

The next morning is perfect, and the air deliciously cool, for the sun, though gathering strength, is not yet a fiery god scorching all things with his gaze. The desert, therefore, is not yet awake. It is dreamy and romantic. The drowsiness of sleep is yet upon its face and in its eyes. The winds as yet are but delicate breezes playing gently with the plants and flowers as tenderly as a lover touches the tresses of his sleeping love.

I remember lunching once in Palm Canyon with my wife and daughter and two friends. We found a great granite boulder that had been washed down and over until it was perfectly smooth. It had lodged near the stream, and both before and behind it giant palms had grown, which now hold it fast in their close embrace. The fan-like leaves completely sheltered the boulder. On one side there was an open entrance while on the other the water dashed noisily by. As we sat there eating our lunch we all observed the different noises made by the water,— the steady, gentle murmur of the continuous flow, with an occasional ker-plunk, ker-plunk in a deep, orotund tone, as of a stone dropped into a well. Above and around us the palms kept up their gentle

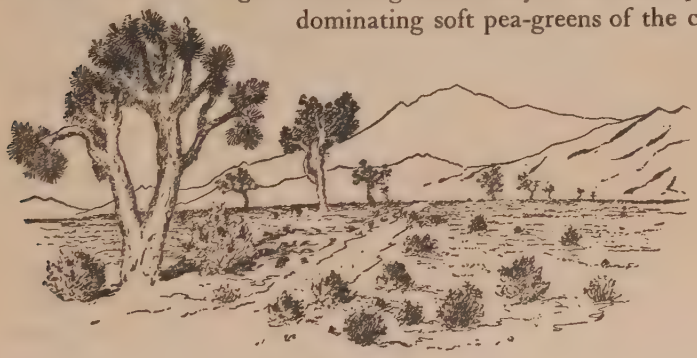
Old stage-station at Palm Springs

rustle, and gave us bewitching changes of sunshine and shade as the great leaves swung to and fro.

As we sat there in the shadow of the palms, knowing the great silent desert was just behind us, and the towering mountain peaks just ahead, we felt full of a strange, expectant awe as if some new, great, wonderful thing might happen at any moment.

The feathery fronds of the palms shut us in from all else in the world. We were alone, alone with our own hearts and God. Nature quietly intruded, however, and sent her gentle zephyrs, odor laden, to be incense at our altar, the birds sang soothingly and restfully the message of sweet peace, and the stream came down, looked at our happiness and hurried on to babble the news to all the world outside, that we were hidden in a place of joy, beauty, peace, and rest.

We returned to Palm Springs in the early afternoon, and, as we approached the settlement, it was a picture that would have charmed George Innes or William Keith. There, half a mile away, stretched a long lane, bordered on the right by fluffy looking cottonwoods of a soft pea-green, and on the left by peppers of a much deeper, richer shade. Both tones were wonderfully accentuated by the two cypress trees which form Dr. Murray's gateway. They seemed dark to blackness compared with the lighter green of the cottonwoods and peppers. The houses, white-gabled and red-roofed, were snugly ensconced under the sheltering protection of trees, the deep colors of the oranges and figs contrasting deliciously with the predominating soft pea-greens of the cot-



On the Morongo Pass road

tonwoods. To the left was the dark, somber, reddish slope of the San Jacinto foot-hills, with a rude nose or promontory bathed in sunlight setting forth in brilliancy the elevated stretch of desert beyond, upon which the brownish green patches of verdure were dotted. Still farther away reached the lower hills of the Sierra San Bernardino, dimpled and shadowed, seamed and canyoned, reddish gray and deepest purple, with their rugged and irregular summits clean cut as a cameo against a cloudless Southern California desert sky.

And coming back to this oasis, as I have done several times after weeks of weary travel on the wide expanse of desolation beyond, how sweet and blessed it all is! The leaves of the trees, with the waxen blossoms of the orange and lemon, or the blushing

blossoms of the almond and apricot, touch one as with tender hands bathed in sweetest perfume. The waters of its tiny creeks whisper of the cooling draughts they will give to mind as well as body. The gentle zephyrs kiss one's face and lips and hands as in tenderest caress, and the skin the fierce desert sun and winds have tanned and scorched is soothed and refreshed. Yet it is not all external, what the oasis gives. The heart beats easier, the pulses are less strong and masterful, the nerves are more under control, and the inward fever of body and brain seems quenched almost as soon as one reclines under the shade of the oasis. And then, penetrating farther, mind and soul are soothed and quieted, and one is able to see how to use the added strength and rugged power he has absorbed from the rude and uncouth, but loving and generous bosom of the desert mother.

CHAPTER XXXIV

A Pasear from the Garden of Eden by way of Morongo Pass and Twenty-Nine Palms to Indio

SITTING on the porch of the little white house in the Garden of Eden one obtains an expansive view of the desert. Out of its dark gray rises one of the big sand-dunes shining rosy in the sunlight, while, four miles away, the oasis of Palm Springs lies, a living green garden amidst the dull color of the wide vastness. Beyond, the horizon is bounded by the faint blue line of the San Bernardino range. To the right and left the descending spurs of the Sierra San Jacinto form the frames of this incomparable picture. Storm clouds float down from the west through the San Gorgonio Pass, dividing themselves into somber armies, flanking off to the north over the far-off hills, and to the right over the San Jacinto range, quickly covering and hiding it from sight.

It is on a morning like this that we start out, with our three burros, for Palm Springs and beyond. Those who see the desert

Garden of Eden

in the summer and fall, or even in the winter, can scarcely believe that the dry, sandy watercourses which cross the roads over which we travel have ever been moistened by water. But let them come at such a time as this. The clouds on the mountains have given forth their burden of rain and now these once dry

"washes" are full of whirling, swirling, roaring waters that have poured out from the canyons and are now on their way into the desert. There are no bridges, so the only way to cross them is to boldly plunge in, after seeing that the burros have crossed. They hesitate before risking it, as their burdens are a little heavy, but, as they stand deliberating on the edge, we give them a deciding push, and, once in, they are soon across. Sometimes incantations are needed, however, to persuade them to cross a particularly noisy stream. We objurgate, and use a variety of picturesque language, as well as perform mysterious movements with divers and sundry sticks. Once or twice they and their packs slip almost out of sight, but fortune favors us and we get over all the streams without anything more serious than a thorough wetting, several times repeated.

Indian ollas

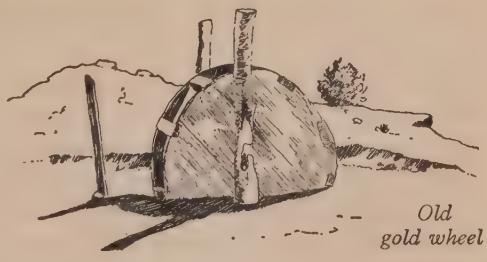
In front of the store at Palm Springs we find quite a caravan of canvas-covered wagons,—prairie schooners of a modern type. It is a band of emigrants coming from arid Arizona to the north country,—Oregon or Washington,—where water is plentiful. Their horses are of fine working strain, and their wagons new and well equipped. There are twenty-one persons in the party, one whole family, from grandfather to babies, and all cheerful, happy, and hopeful. Will they ever grow homesick for the blue sky and the purple mountains of sunny Arizona, "the country that God forgot," as Frances Charles has it? "We know the way back, if we want

The Toutain ranch, Whitewater Canyon

to return!" smilingly answers one of the younger men in answer to our query. To them, here, the word "desert" seems a misnomer. "Desert?" cries one of them, "why we've been having rain half the time since we left Yuma." We also can foretell what they will have to meet when they cross the wash of the Whitewater, swollen by these heavy rains.

The Morongo Pass

We ourselves have to face the flooded wash, and our roads are cut across by the dozen or more of "wild" streams that have overflowed the banks and are seeking to escape in every direction. Yet it is not a disagreeable experience. We have had so much heat, and dry sand to travel over for the past months that this flooded condition comes with the exhilarating excitement of change. So long as we feel there is no danger we rather enjoy the fun of having to urge on our reluctant burros. The rain has clarified the atmosphere and put a "champagney" quality into it, and we walk along, splashing through the water where it courses along in the road-bed, with a "don't care" vim that would be the envy of a city street arab.



Old gold wheel

It is a good thing we don't have to camp out on a flooded road, though, as we have had to do in past experiences. The Whitewater ranch-house is before us, a picturesque old adobe, shaded by aged and gnarled cottonwood trees. It is an historic building, for it was once an important station on the overland stage line. Here the travelers coming west over the desert in the hot days of summer got their first whiffs of sea-breeze, rushing in from the

Pacific over the San Gorgonio Pass. How they longed — when deep down in the desert bowl and exposed to the fierce heat of the noonday sun, which beat down with uncontrolled fury, and beat up with as great intensity from the barren sands and salt-covered plains — to reach this delicious oasis, drink its cool, pure, and refreshing waters, disrobe and bathe all over in it. What luxury, what joy, — plenty of water!

Yes, and the old building has tragic memories as well, for it is boldly whispered that the early dwellers in this whitewashed adobe felt no qualms of conscience at "potting a few inoffensive Indians," merely to keep themselves in practice. A cave, also, has been discovered, not far away, where a few desperadoes lived

The Devil's Garden

who did not hesitate to relieve prosperous miners of their surplus gold-dust.

Though there seems always to be green pasturage at the Whitewater ranch, there is not always plenty of water. We are told that the water is all "ditched" from the Whitewater River, some two to three miles east. Even now the floods have so silted up this ditch that all the drinking water is hauled in barrels from the river and the stock is watered at a "sump" hole in the pasture.

Here we are favored by "rubbing up" against several old prospectors. They come and look at our burros, and, as we take off the packs, comment on the way we have tied them on. One undertakes to show us a new way of "throwing the diamond hitch," another "the squaw hitch," and still another "the figure four hitch." Then when we tell them who we are they laugh each other to scorn and cry, "Sold again!" They took us for "tenderfeet."

Two main desert roads lead from the Whitewater ranch into the desert, — we have just come over the one, we are about to take the other. It strikes off somewhat to the north on to an extended mesa into the Morongo Pass, the connecting link, at this point, between the Mohave and Colorado Deserts. Through this pass the Yumas and Chemehuevis used to come on their visits to the Coahuillas and Serranos of the desert and the San Bernardino Mountains. Afterwards the gold-hunting adventurers and trappers found it a convenient pass. It is also said the Spanish missionaries came this way and left a trace of their presence in the Mission Creek Valley through which we are now passing before we strike the mesa. They taught the Indians how to plant and care for the vine. Then the white man came and drove the Indian out (as he had no legal title) and built an adobe house. Things seemed to thrive and the small lake of water caused by the rains appeared to have become a permanent thing. It struck the fancy of some one and he offered a good price for it, which was taken. Then an earthquake came and made a gash through which all the water escaped. It ruined the valley for the white man and so now a paternal government has handed it over as an Indian reservation.

We unpack the burros by the roadside for an hour's rest at noon and sit down on the rocks to enjoy the wondrous view spread out before us. We have seen it from every possible angle, this desert and its mountain framework, yet it is never less beautiful, never less impressive than it was at first.

When we find ourselves on the mesa we begin to understand why this is called by the prospectors "the devil's garden." It is simply a vast, native, forcing ground for a thousand varieties of cactus. They thrive here as if specially guarded. Here are the tiny *Mamillaria*, hidden where one must hunt for them, and close by various *Opuntias* and *Echinocactus*, especially the large *E. Le Contei*, the largest of them all, the "barrel-cactus," which reminds us somewhat of the giant *Sahuaro*, a few of which I have found on this desert on the California side of the Colorado River. Some of these Echinocactuses are ball-shaped and the local parlance names them "nigger heads." Delightfully interspersed with these various cactuses are flowering creosote

bushes, the whole forming a singularly strange and grotesque piece of landscape gardening. As far as I know it is unique in the United States. On the Mohave Desert, near Hesperia and elsewhere, there are a large number of the *Yucca arborescens*, — the so-called tree yucca, — and near Tucson are thousands of *Sahuaro*, but I know of no place where so many varieties are to be found as in this small area near the Morongo Pass.

It does not take us long to reach the pass, and we find ourselves at one thousand eight hundred feet above sea-level nearly two thousand feet below the San Gorgonio Pass. The shade offered by mountain and brush is tempting to us as well as to our burros, but there is no time for rest now, as pasture and water are offered to us at Chuck Warren's, whose ranch-house reposes in the shelter of some fine old cottonwood trees on the

Entering the Morongo Pass

other side of the valley. He sees us coming and at the watering-trough greets us in his hearty, sincere, pioneer fashion. Bluff, hale, and strong, and with a face that always breaks out into a genial smile at the presence of a friend, at seventy-three he is as healthy and vigorous as a young oak. He got his name from the fact that in the early days he was a teamster on the Chuckwalla trail. So "Chuck" he was called, and Chuck he is from one end of the desert to the other. If he has any other "Christian" name no one knows it or ever thinks of using it, and it is now hallowed, not only by long usage, but by the affection with which his friends speak it. With his wife, his sturdy sons and daughter, he lives his simple life, raising cattle and by irrigation making two blades of grass grow where none grew before. He is taking what he calls a well-earned rest (though

he works twelve and fourteen hours a day) after the hardships of his teamster days.

We stop at the hospitable ranch, unpacking and unsaddling our burros so that they may revel in the rich pasture while we chat with the jolly old man. What a thing it is to live to seventy-three years of age and be as light-hearted and full of fun as a boy!

About nine miles from the ranch is a little outpost where he first settled and that now bears the name Chuck Warren's Well. A cabin, corral, and windmill are always at the disposal of the passing traveler. On a hill not far away is Chuck's "slaughter-house." Here, after the cowboy has picked out and "roped" his "beef," he brings it and it is not many minutes before "beef on the hoof" is converted into beef for the kitchen.

Butchering appliances

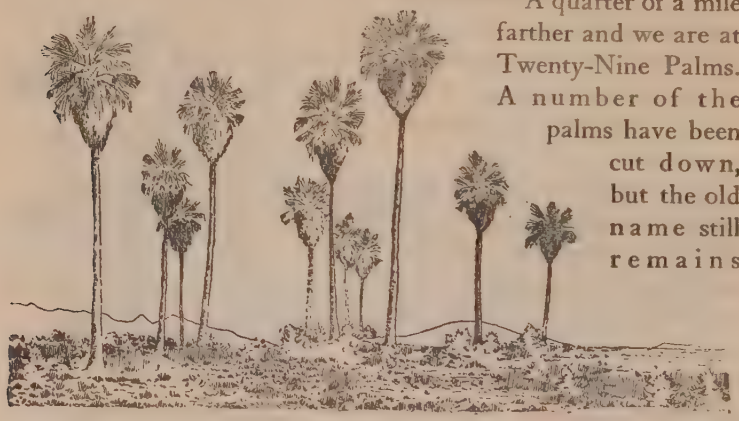
We leave Chuck's place with regret, but we take his hearty hospitality along with us. The road beyond the well is most interesting and by and by we are in a grove of the tree yucca, the *Y. aborescens* or *mohavensis*, which adds its weird and picturesque characteristics to an already peculiar piece of desert. A wide expanse opens up before us, losing itself in the far distance in several rows of sand-hills, bordered by blue lines of mountains which belong to the Mohave Desert. We are now on the border line, though there is no natural or artificially named boundary.

To our right a road leads off to the "Lost Horse Mine." The valleys between those ragged hills over there are scooped out and form reservoirs for water, and should the traveler find them dried out, all he needs to do it to dig down in the sand and he is sure to find water. Such wells are called "coyote holes" by the desert prospector.

It is a long, wearisome journey from Chuck Warren's Well to Twenty-Nine Palms, over twenty-two miles of sandy road,

and we welcome the sight of the long, slender stems clothed with their mysterious crown of rich, dark-green leaves that denote the end of our day's tramp. Before we come to them, however, we stop for a short time at Captain Jim's *kan* and chat with the old Indian and his squaw. Here they live a solitary life, contented and happy, for their needs are well provided for by the little garden, the cattle he owns and the natural gifts of the desert, such as the fruit of the prickly pear, pinion nuts, *chia* seeds, and the like. He was born here and has seen his native place occupied in turn by white men and Mexicans.

A quarter of a mile farther and we are at Twenty-Nine Palms. A number of the palms have been cut down, but the old name still remains

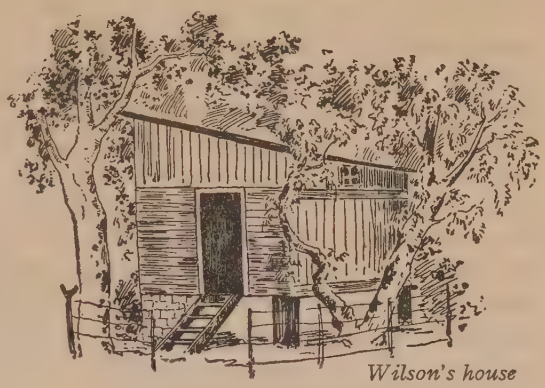


At Twenty-Nine Palms

and doubtless will, even though every palm disappear. It seems almost a crime to cut down these marvelous scions of the desert. They have stood here for centuries, and, like the giant trees of the Big Basin, should be preserved for the generations of the future. Twenty-Nine Palms is the home of "Charley" Wilson, another well-known prospector and miner, who has had varying fortunes from poverty to affluence in his long desert life.

Mr. Wilson takes us out to show us an old Mexican *arrastra*, a primitive ore-crushing machine and mineral-separating mill. Only a part of it remains, but this clearly shows how the simple contrivance did its work. Fastened with chains to cross-beams are heavy flat rocks. The beams are attached to an upright which is made to revolve by mule power. As the rocks revolve,

dragging on the ore beneath, it is crushed and milled. The floor of the pit is grooved, and when the mill is in operation, mercury is put into the grooves to catch the gold or silver as the grinding progresses. Each week, or each month, as judgment dictates, a "clean up" takes place, when the grooves are emptied of their contents (the mixture of mercury and precious metal being called amalgam), which are put into a retort, and separated, the mercury being used again in the mill.



Wilson's house

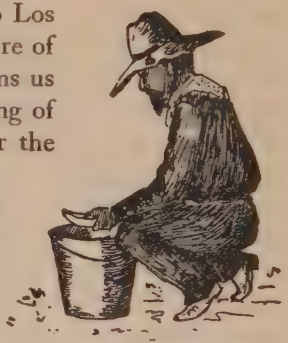
The next morning as we pack the burros Captain Jim appears and his pleasing voice inquires, "You go away?" Before we

Working the arastra at Twenty-Nine Palms

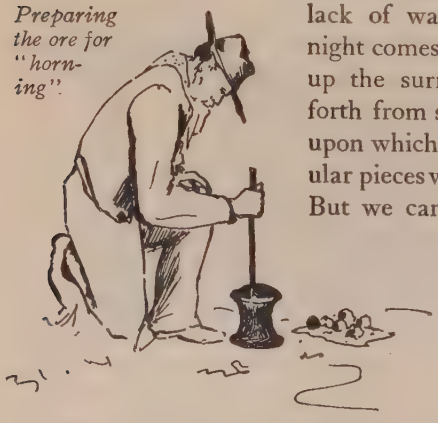
go he tells us of the days that he well remembers when antelope, deer, and mountain-sheep abounded in this valley, and when, also, there were plenty of Indians. "But now," said he, "they are all gone," and he makes an expressive gesture with both

hands and arms, signifying that they are scattered, never to return. Yet, though we belong to the race which has done his race so much injury, he shakes hands with us and bids us "Come again" with a heartiness that betokens its simple sincerity.

Eight miles of travel brings us to Gold Park, a number of mining claims belonging to Los Angeles capitalists. The camp is in care of a Mr. Sullivan, who on our arrival informs us that he is anxiously awaiting the coming of the wagons which are to bring men for the mine, provisions, and other needed supplies. As his disappointment seems to add to his loneliness we respond to his hearty invitation to "unpack," by taking off the packs from the burros and making ourselves at home for the night. For fifteen years he has wandered over the desert, prospecting and mining, and many a tale he tells us of hair-raising experiences with Indians and wild beasts, and the natural horrors and terrors of the desert,—sand-storms, floods, fierce winter winds, lack of water, and the like. When night comes and our pleasant fire lights up the surrounding gloom he brings forth from some hidden recess a violin, upon which he plays a number of popular pieces with both skill and precision. But we can see he is uncomfortable. Is it the absence of the men? No! Short of provisions? No! Well, what is it? Then the confession comes. He is out of tobacco, and he notices that the smoker of our party has scraped every last grain out of his tobacco sack, so that he knows *he* is also "out," and he is just "dying" for a smoke. So early next morning he decides to walk on with us to El Do-



"Horning" for gold



Preparing the ore for "horning"

rado, eight miles away, where brother miners will relieve his craving. We climb many a hill and pass many a "prospect hole," so that the white tents of El Dorado are a welcome sight. The superintendent, Mr. W. Brydon, kindly invites us to lunch and then shows us around the camp. Touching upon the subject of reptiles, he assures us that his men have killed thirty rattlesnakes during the last two months. There are also a large number of chuckwallas, as well as the ordinary varieties of smaller lizards, in the region.

El Dorado is one of the discoveries of Charley Wilson and is now owned by the El Dorado Consolidated Mining Co., of Los Angeles, California. Not far away is the scene of a desert tragedy. It has often been said that many of the mines of Arizona are marked with the brand of Cain, for there are few that have not witnessed the murderous shedding of human blood. While this is not true of the mines of the desert, there are some that bear the homicidal curse. This particular claim is called "Deadman's Hole." Two miners owned it in joint partnership and for a while all went well. Then one grew suspicious of the other and accused him of selling ore on the sly. When the quarrel was known other miners interfered and took sides, and it ended in a shooting affray in which two men, a father and his son, were slain.

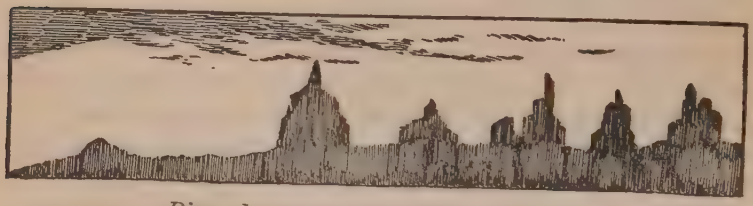
As we leave El Dorado Camp we carry away the impression that erelong this mining district will be heard from. The indications are very favorable and if they hold out, good mines are sure to result.

Dark clouds are gathering over the mountains and for a while it seems as if we shall be drenched, but the skies clear again ere we reach a little rock-house and tent four miles from El Dorado. It belongs to the Hersey Mine, and a little well of water, with a slight sulphurous taste, explains the location of the house.

A wearisome afternoon's walk is ahead of us through a long valley, where the road reaches on and on apparently without end. After tramping until after sunset we find it makes a swerve to the south and enters a canyon. Before we leave the valley we turn around and are enchanted with a group of rocks sharply outlined against the evening sky, appearing more like a row of

imposing castles crowning a high mesa than natural objects out in the desert. As we turn again the supposititious castles disappear, but shortly afterward a pleasing reality takes their place in the form of the Pinion Camp, the place we have decided upon for our night's stopping place. There are a few cabins and a stamp mill situated in a cozy nook in the mountains, and — pleasing fact — the homes of families, where the voices of women and children are heard.

The next morning we pass down an unnamed canyon, green with trees, shrubs, and flowers. The pinion grows here side by side with the yucca and cedar, and with the flowers it seems incongruous to call this a desert country. Now everything is green and beautiful. The profuse rains have made them so. But soon, when the moisture is gone, all save a few hardy plants



Pinnacles at entrance of Pinion Canyon

and trees will disappear, and one passing through then could scarcely realize that it was the place he had seen as we see it now.

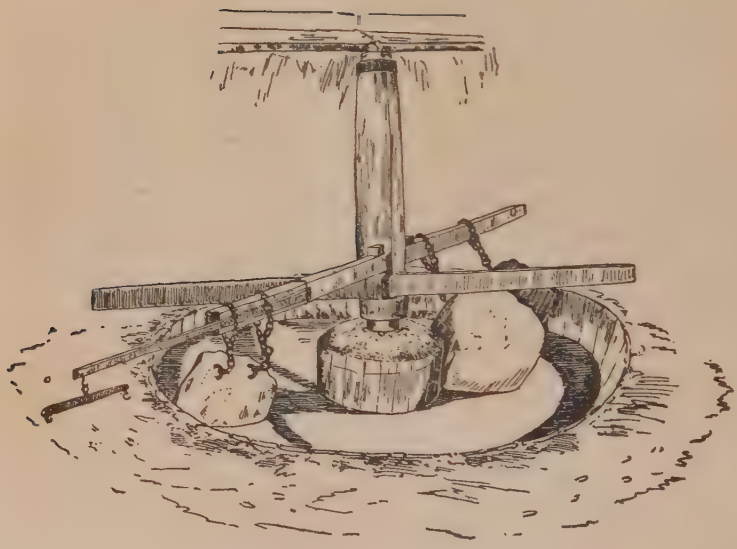
Gradually, however, a change takes place. The green vanishes, the trees grow scarcer and even the yuccas become few and far between, and we find ourselves in a canyon deeply cut out by floods and strewn with water-washed rocks and deep sand. Bleak mountain walls frown down upon us and they seem to soar upward and reach out forever. With every turn we hope to catch a glimpse of the desert, but we are regularly disappointed. A boarded well appears, but we do not stop for water, as we know we must be approaching Indio. When travelers come to this well in the opposite direction it is completely hidden by a large rock, into which Nature has carved recesses which serve as a cupboard for rough-and-ready camp cooking utensils.

Photo. by H. C. Tibbitts, San Francisco, Cal.

PALMS AT INDIO ON THE COLORADO DESERT

How welcome the sudden apparition of the well must be to weary and thirsty travelers from Indio who come over this road for the first time!

At last we reach the open, but there is another mountain range ahead of us through which we must pass ere we can see Indio, so at a convenient spot we stop and unpack and eat lunch. The burros evidently share our longing to take a nap, even though there is scant shade in the lee of the small bush where we sit, but we must press on. They are very unwilling to rise and resume their packs. They are evidently tired out, but we push steadily on, and by the middle of the afternoon reach the brow of our last hill. Again the desert is before us, made green for miles by thousands of mesquites. Yonder is Indio, sheltered in a bower of cottonwoods, and with the tufts of the palms showing here and there in tropical beauty. Another hour and our burros are feeding on good grass close to the old adobe schoolhouse and we are again in the land of railways and the bustle of men.



Old arastra at Twenty-Nine Palms

Photo. by George Wharton James

THE ALAMO RIVER CONVEYING THE OVERFLOW WATER OF THE COLORADO TO THE SALTON SEA, APPROACHING SHARPS

CHAPTER XXXV

From Yuma, down the Overflow of the Colorado to the Salton Sea

IN the following chapter I will describe the Salton Sea, its origin, present state, and the efforts made to shut off the flow of the Colorado River into it. On Thursday, March 8, 1906, I started with several companions to fully explore the flow of the Colorado River and to follow it whithersoever it went until it finally emptied in the Salton Sea. Our explorations led us down the Alamo River, a trip that had never before been taken. Yet it was not the first trip ever made down the overflow of the Colorado River to the Salton Sea. When the uprise of the Salton occurred in 1891, the *San Francisco Examiner* empowered Mr. H. W. Patton, then editor of the *Banning Herald*, to take a boat at Yuma and follow the overflow to the Salton Sea. He did so, guided by Mr. J. E. Carter, one of the best-posted white men familiar with the Colorado River below Yuma. They, however, went by the New River and reached Salton after an exciting and adventurous trip. Owing to Mr. Patton's haste to reach the nearest railway and telegraph station a rather amusing report of his arrival was sent out. His boat reached a point some miles below the station of Salton, so he left it and persuaded the foreman of a railway gang to allow him to ride to the station on the pump-car. The wag at the telegraph office at once reported to rival papers in San Francisco that Mr. Harry Patton, who was sent by the *Examiner* to go by boat from Yuma to the Salton Sea, "*had just arrived at Salton on a hand-car.*"

We arrived at the railway on foot after our journey, having had to walk eighteen miles and ford several sloughs to get there. The whole story I will now recount.

Purchasing two boats at Yuma, one a flat-bottomed ordinary gig, stoutly built, with six oars, and the other a mere tub or light scow, with flat bottom and stub nose, such as miners and prospectors have made to float down the Colorado River, our party of six whites left "the city of torrid heat." There were Brown (partner of Burton Holmes, the well-known lecturer), Gripton, of New York; Van Anderson, of New York; Judson, dean of Fine Arts department of University of Southern California; Lea, missionary to the Yumas; and myself, whom the boys in fun called "Commodore."

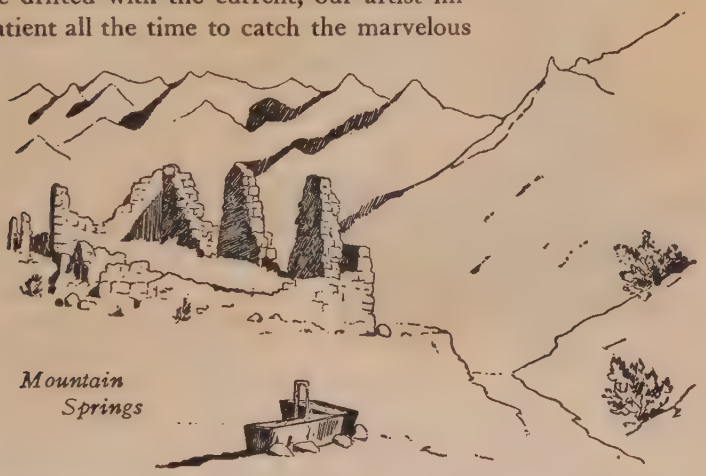
We had been warned of the dangers and difficulties we were sure to encounter. There were some ten miles where the wild river ran through a mesquite forest, through which we should have to cut, push, force our way. One of the men who had tried, failed and returned. Then, if we succeeded in getting through the mesquite and reached Sharps—the point in Mexico where the waters are taken and distributed through head-gates into the irrigating canals of the Imperial country—we should have some fifty miles of the Alamo River to run which had never before been done. The difference in level between the water at Sharps and at the Salton Sea is nearly three hundred feet, and a fall of three hundred feet in fifty miles surely meant rapids galore; indeed we were warned that we should make the "fifty miles in fifty minutes." Then the engineers assured us that the force of the flood had so scoured out the channel that the banks, from being mere ridges, were now high walls thirty, forty, fifty and more feet high, and one great danger to be apprehended and guarded against was the fact that the rapid flow of the stream was constantly undermining certain portions of these banks and they fell into the stream in such vast quantity that they would destroy or sink any boat unfortunate enough to be under them.

On the Alamo River

This was a serious enough danger as we afterwards learned when we saw thousands of tons of earth fall, sending up great waves which came near swamping our boats.

Certain custom-house officers whom we met assured us that we should all be good ship-carpenters before our trip was concluded, and another desert humorist warned us to be ready with an axe so that when snags came through the bottom of our boats we could cut them off. Then, said he, "You'll have enough from what you've cut off to use as fire-wood."

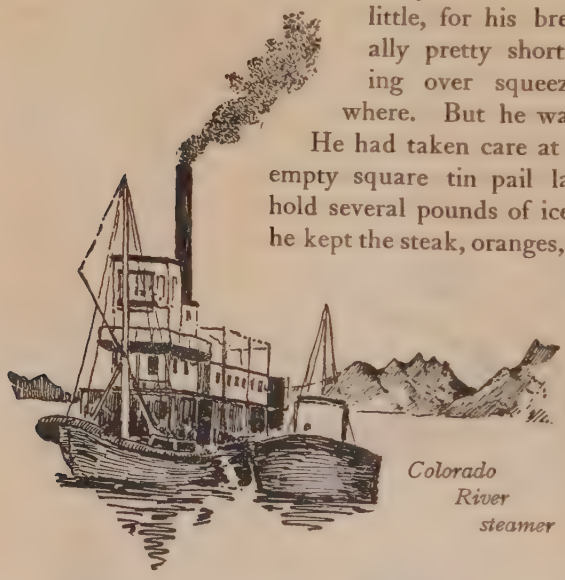
We were a jolly party when we set out from Yuma. Easily we drifted with the current, our artist impatient all the time to catch the marvelous



colors that seemed to be produced that evening for his especial delectation. I shall never forget his delight when I pulled inshore and called out, "Camp for the night." Forgetful of everything he jumped out, and came near being swallowed up in the quicksand, for here there is little or no clay to make wet parts of the banks secure. Without waiting, however, to cleanse himself from the mud, he fixed his easel and in a few moments was oblivious to the world, the flesh, and the devil in the revelry of color the sunset was giving him.

Brownie was quite a chef. It is not often that the business manager for an eminent lecturer can throw aside his dignity and tie on big boots, throw on a sombrero and wear a flannel

shirt, and cook over a camp-fire for eight hungry vandals. Yet that was what Brownie did to perfection. He is a great singer also, and in the development of his chest has done wonders. But, while cooking, it always seemed to me that his chest development had slipped down a little, for his breath was generally pretty short as if the stooping over squeezed him somewhere. But he was a good cook. He had taken care at Yuma to get an empty square tin pail large enough to hold several pounds of ice, and upon this he kept the steak, oranges, and grape fruit. Imagine having grape fruit for breakfast on a camping-out trip. Sleeping out of doors is great fun in a dry, healthy country, and to see the eight of us early that morning rolled up on the sand with nothing but our heads sticking out was enough to tempt one of us to fire off a gun. It scared the boys nearly out of their wits, but they were soon up and ready for breakfast.



Colorado River steamer

By noon we were examining the work being done for the permanent head-gate, a magnificent reinforced concrete structure that is to receive the main supply of water for the Imperial region.

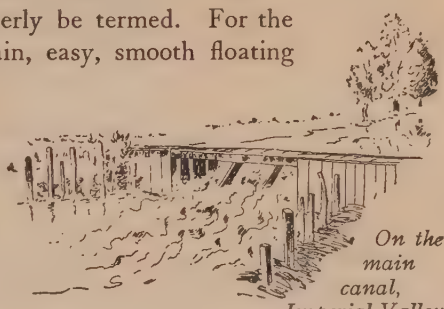
Later in the day we came to the scene of the desperate efforts — six in number — made to control the unexpected flood of the Colorado, already described.

A mile or so below this point we reached the busy and bustling camp of the lower intake, with store, bakery, large dining-tents, doctor's office, steam-engines, pile-drivers, centrifugal suc-

tion-pumps, electric-light plants, all revealing the great activity and determined pressure of the work. All the men that could possibly be used were working day and night on the construction of the Rockwood head-gate.

Here our Indians joined us for the main part of the trip. Talk about Indians being fools! They were both keen, observing, wide-awake, daring, serene in the face of danger, self-contained and hard working. There's many a white man who would look down on these "savages" who could not begin to compare with them in intelligence and practical usefulness.

Leaving the lower intake in three boats with six whites and these two Indians we started down the Alamo—as the canal should properly be termed. For the first ten miles it was plain, easy, smooth floating on the bosom of a great river, for, as I have shown, all the water of the Colorado was pouring through the "temporary cut" into it. The great volume had widened and deepened the channel until now it was no longer a "canal," but a mighty river, nearly 1,000 feet across.



On the main canal, Imperial Valley

At the end of this ten miles our troubles began. As we had been warned, we found the river had left its bed and overflowed the country in every direction, in all of which was a mesquite forest. The mesquite, for all practical purposes where man is concerned, should be called the *mescratch*, for its thorns are large, sharp, and penetrating. As the diminished current bore us on we ran end on, stern on, sidewise, anyhow into these mesquite thorns. I was in the front boat, in he bow, seeking the way. As the stream divided and subdivided it required speedy observation to tell which was the larger cur ent and follow it, and Jim and I were kept very busy. There was no time given for decision, for we were borne on into one of the waiting trees, ready to pierce us from "stem to stern" with its poisonous thorns. I learned to "take" them head on as a

goat takes its foes. Pulling my broad-brimmed sombrero over my ears, lifting up my coat collar, and lowering my head I "butted in." But the fun came when we stuck there. Fun? Oh, it was great, to find yourself lodged in the heart of the branches of a mesquite, the thorns making fresh punctures in your tires at every movement, and the uneasy current beneath swaying and swinging you to and fro! Many a time we had to resort to machete, hatchet, or axe and literally chop our way through. Then, as the many divisions and diversions of the current reduced the flow of water, we ran on to sand-bars in these mesquites and for hours at a time had to wade in the water, up to our middles, often sinking in the quicksands up to our knees and higher, lifting, pushing, pulling, straining to get our boats along while the mesquite thorns got in their work.

And the *joy* of it was increased as night came on. We were still in the thick of it. No place to camp. Not a sign of dry bank anywhere. There was nothing for it but to stop in the first break big enough for three boats to be tied side by side, for misery loves and needs company, and eating our cold supper, scratched from top to toe, wet through, muddy, bedraggled, and wretched in appearance, our "joy" was added to by a heavy downpour of rain. Physically we were so miserable that it made us laugh.

Where were we to sleep?

Nowhere but in the boats. Now it cannot be conceded that the slats at the bottom of a boat are at all conducive to sleep, especially when the slats are wet and very muddy. With evident shrinking these scions of noble houses stretched out their blankets. Brownie and Lea took the scow, the two Indians the bow of the big boat, Grippie the wide stern-seat, to which he built an extension for his feet, and Van on the slats below, while I had the other small boat to myself.

My! how it did pour, and I guess those boats leaked extra on purpose. Wet through, I awoke to find Van wringing out his blankets, and at another time to hear Grippie laughing as if he would burst. "What's up?" I asked, to which he gave the intelligible response, "I'm laughing because I'm so miserable."

In the morning the parson looked as if he'd been "bucking the tiger" all night, and Brownie had the same appearance as when

the box office "returns" show a deficit. Grippie laughed some more, which denoted the depth of wretchedness and despair into which he had sunk.

No hot coffee! no hot steak! no steaming fried onions! no hot anything, except a hot temper. But we had vowed we would "grin and bear" whatever came along, so with "brave hearts and dauntless spirits" we swallowed a cold biscuit and started on.

It was four times worse that morning than it had been the preceding day. Hour after hour we toiled along, up to the waist in water, chopping, cutting, pushing, pulling, and getting scratched. Mainly the latter. Several times we had to cut down mesquite trees that completely blocked our way, and I never knew before how hard it was to cut down a tree below the water line. For, of course, if the stump was left high enough to prevent our boats going over them we might as well have left the trees standing.

The desert traveler's way of making biscuits

Hour after hour it kept up, until at last peace reigned within, for we were back again in the main current and channel. The contour of the country here is such that, while a small part of the water had escaped and flowed off by way of the Rio Padrones, the larger amount converges and reënters the banks of the Alamo at a point called Seven Wells. As soon as we could we camped, spread out our bedding to dry, while Brownie made sweet music with steak, onions, potatoes, and corn on the frying-pan and stew-kettles.

That night in camp on the Alamo we uneasily tossed on our blankets, for all of us had a number of thorns deep seated in various and many parts of our systems. While the thorns in our bodies made our sleep that night somewhat disturbed, it was a great improvement upon the night we spent in the boats.

The following day we had reasonably good rowing, though the wind arose and blew dead against us for several miles. But with a fair current in our favor we were able to make headway. We

passed hundreds of thousands of aquatic birds, which nest and live here in almost perfect seclusion. Hardly a soul in a year passes them, so that they are almost as tame as domestic fowl. We rowed our boats again and again to within fifty feet of great solemn blue herons, standing overlooking the places where fish were likely to be caught. In one place we found a heronry where fully a thousand nests could be counted.

Now and again a sea-gull would follow us, just as the gulls do the steamers that cross San Francisco Bay, as if eager for us to give them something, and one could not help questioning whether these birds had ever had the training of the bay, or were wild birds with a natural instinct to follow anything which seemed to suggest the possibility of food.

A boating paradise near Calexico

But by far the most beautiful of all the bird sights we saw was the recurrence of flocks of pelicans, soaring far up in the sky. Hundreds and possibly thousands of these birds were flocked together, and apparently soaring without purpose at a distance of perhaps a mile from us. Up and down, back and forth, whirling and circling, doubling and countering, rising and falling, they moved, their white wings glistening and brightening in the sun while at one angle, and the next, the black tips giving forth an entirely different effect. It was as if flocks of sunshine and shadow, light and darkness, were playing at hide-and-seek in the sky. For hours we saw these moving flocks, and at each fresh sight they seemed to possess a new grace and beauty.

We found eagles' nests quite common, and in several cases one of the party climbed up to the nests. We brought away two eggs only, to determine the species of the eagle, as we did in the case of several other birds, such as owls, hawks, and a bird the Indian called a squawk, in onomatopœic representation of its cry.

That afternoon we reached Sharps, the point in Mexico where the waters of the river are taken and diverted into the canals of

Photo. by George Wharton James

ON THE ALAMO, TWO DAYS FROM THE SALTON SEA

the Imperial region. Leaving one of our boats here, we were soon gliding easily along down the strong current. There was a trifle of nervousness at first, lest we get too far apart, and one or the other of us get into trouble, so the order was, "Keep close together, and listen for each other's signals." Our first rapid gave us quite a little thrill. It was nothing very great or dangerous, but to hear the roar and rush, and swish and dash of the water, and to see the rising and falling, the spray and spume, and the marked descent of the whole river for fifty feet or more, led us to wonder if we'd get through all right. Indian Jim at the oars and I with the steering oar, we sent our boat right into the heart of it, and in a moment we were rising and falling, tossing and bouncing, from one wave to another. We shipped a little water, but not enough to scare us, so it was with bolder hearts we ran the next and the next.

Soon the lookout called, "Two water-tanks ahead," and when we all arose to see, there loomed before us on the right the tanks of the power house at Holtville. We tied up here, for three of our party, Brownie, Gripton, and Lea, had to leave us, and Indian Joe went with them. They took team for Imperial, while Van Anderson, Indian Jim, and I were left to run the rapids alone.

The question arose in my mind: Shall we go in two boats or one? The square-nosed scow had served us so well I hated to part with it, so, without consulting the others, I decided to handle it myself. We started, and almost immediately ran into a "nasty" place. The railway bridge crosses the Alamo a short distance from where we were camped. It rests upon piles which stand obliquely to the course of the river. The result was that my boat was swept down and struck the piles, swerved into a snag with a lot of branches which had caught in nearly the same spot, and came near upsetting. There I was, held fast by the force of the current, and imprisoned in the arms of the snag. It took quite a time of pulling, pushing, and cutting before I got loose. Then on we went again.

That was the beginning of the real fun of the trip. That afternoon and the next day we must have run over fifty rapids, some short, some long, some rough and dangerous, but most of them just exhilarating and exciting. How one's blood tingled with the dash and roar, the speed and the tossing, and how one's hands,

wrists, and arms had to work to keep the boat safe while in the middle of the rapids! We had no great rocks to contend with, but something equally dangerous. The rapids were filled with heavy masses of "nigger-head" clay, and once or twice I got ugly bumps on these "heads" that shook the boat from end to end and nearly toppled me head over heels.

In several places the river widened out for half a mile or even a mile and the flats were covered with ducks, geese, and pelicans. I think I saw more of these aquatic birds in these two or three days than I had seen in the whole of my previous life. In some cases we were allowed to come as near to them as fifty feet, and with a gun an expert shot could have had his choice out of the thousands.

Cameron Lake before the 1906 flood

And now we experienced the reality of one of the dangers against which we had been warned and that I had all along foreseen. The boats were about fifty feet apart. We were in the radius of a great curve. The mad river was here boring under the bank, which was fully forty feet high. No one who has not seen the cutting, or literally the auger-like boring power of this river in such places can believe the extent of its work. It cut in deeply, and removed the entire foundation of the bank for ten, fifteen, even twenty feet. Then, without a premonitory warning, the whole bank, for fifteen or twenty feet back, dropped with a terrific splash into the river. And it fell off as if cut with some gigantic machine, almost as straight as the cutter slices a bar of soap. Both boats were almost swamped by the great waves that ensued, but fortunately neither of us was immediately

under the bank, or this account would have had a more somber ending.

That night we camped at the deserted shack of a settler who had "taken up" a homestead. We saw many pathetic evidences of a woman's presence in the rude and simple efforts to care for a woman's comfort. Just before the shack, the rapids dashed on to the sea. Early in the morning we started and for an hour had hard rowing. The banks were all gone. There was nothing but flats over which the river distributed itself, making it very hard to find the main current. The wind began to blow and erelong a perfect gale made waves which added to our difficulties. Soon I was completely stranded. I had been aground several times before, but this was permanent. The wind was blowing furiously and my companions could not hear my shouts, but fortunately one of them saw my predicament and they ran ashore and waited. There was but one thing to do. That was for me to go to them. Jumping into the water, and sinking up almost to the middle in quicksands, I struggled against the wind to reach them. Each time I pulled myself out of the treacherous sand the wind blew me back, and for a while I despaired of making headway. But keeping desperately at it I succeeded at last in reaching their boat, where I fell over breathless, speechless, and exhausted. When I was able to move we all jumped out into the water and lifted and pushed the boat back to where the other boat was stranded. There we took out everything of value, and said our final farewell to it.

But our difficulties were not over. Though the three of us handled the oars, the six of them made so little headway that two hours' rowing advanced us not more than half a mile. By this time the waves were running high and furious, and Jim, the Indian, got scared. He cried out: "I no like this river. Pretty soon we tip over and this boat he sink. We no get there."

"Are you scared, Jim?" I asked.

"No!" he responded quickly, "I no scared, but I no like 'em this river."

Each time we got into the trough we shipped so much water that finally I decided to abandon the attempt to cross the sea. Giving the order, we turned stern to the wind and soon rowed

over the flats, the water having been blown over them to a depth of several inches with the wind, and ran ashore opposite a large volcanic butte that stood out in the heart of the desert.

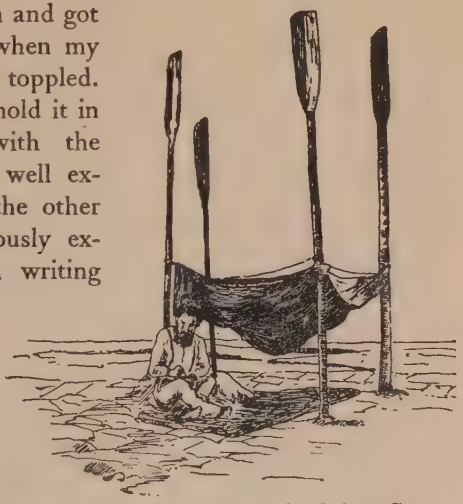
We anchored the boat as well as we could and then proceeded to carry everything from the boat to the butte, where, pretty well above the then level of the sea, we piled them up, covered them with our bed-canvas and tied them down to the anchoring rocks.

Then we started, each heavily laden with cameras, canteens, and food, for the nearest point on the railway. The efflorescing salts made a yielding crust on the alkali soil in which we sank over the ankles at every step. One of my ankles was soon cut through and I suffered intensely. To add to our difficulties we soon came to the brink of a wide slough, far too deep for us to ford, and it was impossible to swim across heavy laden as we were. There was no other course than to go around it, and this added several weary miles to our tramp. At length, after full eighteen miles of a walk, wearied out but glad at the accomplishment of our trip, we reached Imperial Junction, from which point Indian Jim and I went to Yuma, while Van Anderson remained there all night, taking the morning train for Mecca.

Some ten days later we decided to return to the cache and obtain our bedding, camera, supplies, etc. If we found the boat we were to row to some point nearer to the railroad, so that we should not have so difficult a task to carry our heavy outfit. To avoid the eighteen-mile walk I determined to leave from a nearer station and ford or swim whatever sloughs we came to. It was hot and blinding when we started and mirages were on every hand. When we reached the first slough, as it did not appear very deep, I waded right in. It took me up to the middle. Soon we passed the mud volcanoes, fully described in their own chapter.

From here we walked and crossed four more sloughs and at last reached a wide one which we could not ford. So I decided I would try to swim across several times and carry our clothes and the pack, in which was our provisions, on my head. I took over my own clothes all right, though it was a top-heavy affair as I had nothing but string to tie the pack on with. I did not do so well with Van's, for just as I got into the middle of the stream the

awkward bundle made a lurch forward; I had to grab it and was partially ducked and so was the pack, but I succeeded in getting it across. For the third pack I took part of our provisions, my wallet, etc., and wrapped them up. It was a heavier pack than any of the others, and as I stepped down into the deep water I went into a hole, over my head in water. I started to swim and got part of the way across when my load lurched and over it toppled. It was all I could do to hold it in one hand and swim with the other, and I was pretty well exhausted when I got to the other side. I was also nervously exhausted, for I had been writing for the past three nights and had not had more than three hours' sleep in each twenty-four hours. The cold water and wind were chilling me through so that I was used up. We decided, therefore, to leave the rest of our goods on the other side, go on to the cache, get our things and the boat (if fortune favored us that much) and row back that night and camp where we had left the pack. Another slough, deep but fordable, though up to the breast, gave us a thorough wetting. But we were rejoiced finally at the sight of our cache. The rain had done a little damage and two mice had made nests in our oatmeal package. All other things were practically in good order. In the distance the boat moved to and fro on the water. Careful estimate showed a rise of about nine inches since we were there. It was hard work packing our oars, bedding, camera, and supplies back to the boat over the soft yielding soil of the flats near the sea. At last it was done. It was nearly sunset. The sun had quite gone before we reached the mouth of the slough, but we made camp, and, all wet



Resting on the edge of the Salton Sea

through though we were, we rolled into our blankets — thankful for them — and went to sleep. In the morning it was even less pleasant, for it was cool, and all our clothes were wet through. So we did without them. There was not a shred of anything to make fire with, so we ate a cold lunch, and then, still naked, got into our boats and rowed ourselves warm. As we progressed the sea became very rough, and compelled us to shoot across as quickly as we could to the nearest point for Volcano station.

Before we landed I became very seasick and was thankful to get ashore. Here I determined to spend the day, drying out our bedding, and getting some sleep. We fixed up a canvas awning on four of our oars and rested there all day. It was night before I got over feeling so wretched, but when evening came I began to plan to get away. We had to carry about 300 pounds of stuff to the station, which was fully four miles away. Van took the camera case and my book and pamphlet case while I got supper. As the flat was as bare as a bald head of anything of which I could make a fire, I carried the coffee-pot, stew-kettle (into which I had already cut up potatoes and three onions), and the rest of the provision for supper and breakfast to the old railway track a mile away, where, with abandoned ties, I made first a good cooking fire and then a camp-fire. I got supper ready, and it smelled good. Van was a long time coming. I hollered! No reply. I waited half an hour — an hour longer — still he didn't come! So I piled on two more ties and ate my supper. Just as I was finishing I called again. No response! Half an hour later I shouted, and from the far darkness came his reply. When, finally, he reached camp, tired out and hungry, I learned that he had had to cross a dozen deep gullies or arroyos, all of which were awkward to cross. Not a sign of them could be seen at a distance, and little until you were almost upon them. The country is here and there seamed with them and they make walking *with a burden* very wearisome as I discovered anew next day. After Van had had his supper we walked back in the moonlight to our beds by the sea where our boat was.

It was a wonderful morning when we awoke. It was cloudy and cool. After breakfast we carried our things to the depot. Each pack seemed to weigh 350 pounds before we reached the station,

Photo. by George Wharton James

"VAN" AND HIS PACK AFTER WALKING FROM THE BOAT ON THE SALTON SEA

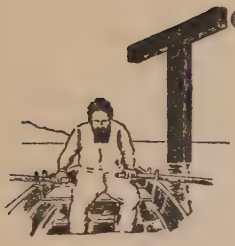
but persistence and patience got us there at last and our journey was at an end.

In the former chapter I have told how we afterwards hunted for the boat but could not find it. It is now doubtless wandering, a derelict on the Salton Sea, or is being used by trackmen or Indians.

A side gorge in the San Jacinto Mountains

CHAPTER XXXVI

The Salton Sea and Its Mystery



TO the scientific observer, even, the vastness of the importance of recent events at the site of the work of the California Development Company on the Colorado River, just on and over the Mexican Boundary Line, is not apparent. They are not only of national but of international importance and consequence. Already the national government of Mexico has appointed a commission to report on the matter, and our own government has instituted thorough and searching inquiries through its corps of engineers of the U. S. Reclamation Service.

As a result of the cutting of a small canal — a temporary expedient for relieving a water-shortage caused by the silting of a few miles of the already existent canal — the body of water of the whole Colorado River has been absolutely diverted from its proper channel. Not a single drop flows beyond this new canal intake. Its floor is as dry as a desert. Where for centuries this muddy and lazy stream flowed along in silent majesty to the Gulf of California, there now appears nothing but a dry bed, as void of water as a desert, and as desolate as the course of a flood can make it.

Where, on the other hand, for untold years, a salty, dry basin of an extinct inland sea existed, there is now to be found in the heart of Southern California an exquisitely beautiful lake, nearly fifty miles long and in places twenty miles broad. A sea in the heart of the American Sahara! For this portion of the Colorado Desert has been declared by the government experts to "have a more pronounced desert climate than those parts of the Sahara Desert where regular meteorological observations are made."

These are startling facts; facts which have an important bearing upon the development of this interesting portion of our great Republic.

In its passage across the Salton Basin the main line of the Southern Pacific was laid at a very low level, and therefore when the water reached its tracks, transcontinental traffic by this route for both passengers and freight was seriously threatened. A shoofly was built around the rising waters, in the hope that they would soon subside. This was speedily flooded; another was built only to be submerged in the same way. Then another and yet another, until, in desperation, the Southern Pacific tore up as much of its track as was possible in the immediate vicinity of the water and in April completed forty miles of new track upon a higher level.

Now (October, 1906), to provide against possible contingencies, the railway company is planning to place its tracks at a still higher level.

This is by no means the first time the Salton Basin has been flooded since its prehistoric evaporation and becoming of a "playa."

When Dr. Veatch visited the mud volcanoes in 1857 he reported the Salton Sea — though he did not know it by that name — as "a vast sheet of crystalline chloride of sodium. Into this lake the arm of the Colorado, known as New River, discharges itself. The lake, having no outlet, would probably soon regain its ancient area if the channel of New River afforded a more generous supply of water."

He refers to the New River as having broken away from the Colorado only a few years before that time.

Several times between 1857 and 1891 fugitive references may be found to overflows of the Colorado causing a rise of water in the Salton Basin, but it was not until after the New Liverpool Salt-Works was in active operation that these intermittent risings caused any uneasiness.

In 1891, on the 23d of June, a large volume of water was found flowing into the basin some thirty miles south of the salt-works. Various theories were propounded to account for the unusual phenomenon, but none being satisfactory, the manager of the

Photo. by George Wharton James

COLORADO RIVER POURING IN AT THE "CUT"

salt-works, Mr. George Durbrow, determined to investigate. He found that in the preceding February there had been a high flood in the Colorado and that, below Yuma, near the Algodones, it had overflowed its banks. Some of this overflow water filled up various depressions and remained until the annual flood, caused by the melting snows, occurred in the following June. The waters of this second flow uniting with those of the February flood forced a large volume into the north-flowing channel of the Alamo, thus speedily forming a lake in the Salton Basin ten miles wide by thirty miles long, and about five feet deep in its deepest part. As this flood soon evaporated and caused but little trouble no further attention was paid to it, but when it occurred again in 1905 and rose far above its former level, causing the destruction of the salt-works and the submerging of the railway track, it was found necessary to direct a great deal of attention to it.

The cause of this flood is primarily to be placed upon the imperfect financing of the California Development Company.

As a consequence of inadequacy of funds the engineer in planning for the rapid development of the Imperial Valley was compelled perforce to meet urgent and imperative necessities rather than perform solid and permanent work. Two thousand dollars were compelled to be spread over work that required ten thousand. The results were disastrous. In the winter of 1903–4 the company was unable to supply all demands for water and this caused a crop failure on some lands. A hue and cry was at once raised; agitation was begun for government ownership; sensational attacks were made on the company by the press; damage suits amounting to $400,000 were threatened or brought. As was easy to foresee, this ruined the credit of the company and still further hampered its operations.

During the summer floods of 1904 the first four miles of the canal from the river was silted to such an extent that it would not furnish enough water for the needs of the coming winter grain crop. With the machinery at their disposal the company had insufficient time to dredge this four miles. One alternative presented itself. They had either to face another water shortage, which meant ruin to many settlers as well as themselves, or resort

to what had several times been done before elsewhere, viz., *cut another channel between the river and canal at a point below the silted four miles*. The distance across was only 3,300 feet; two weeks' work for the dredger. The fall of the canal for eight miles below this point was five-tenths of a foot per mile. From here the canal dropped eight feet in the next three miles, but as the river from this proposed lower intake had a fall of approximately one foot to the mile, the danger of retrogression of grades in the canal and a change in the channel of the river seemed very remote, and it was decided, as the least of two evils, to cut the channel through and put in a controlling gate *later* if they had funds sufficient; if not, then to close it by a brush-dam before the approach of the summer floods. There is the cause of the trouble in a nutshell, — lack of proper funds and

Stone corrals at Mountain Springs

the choice between bringing ruin on thousands of settlers through lack of water for their crops and the cutting of a temporary canal to supply this lack. This is where the nub of criticism has lain. The necessity for controlling head-gates at the heads of canals is recognized by all engineers, was fully recognized here by Mr. C. R. Rockwood, the chief engineer, but time was limited and ruin for thousands was before him. What could he do? He did what any rational man in similar circumstances would have done, — *he took the chances*. Had nothing unforeseen happened practically nothing would have been said. Men the world over are always taking desperate chances. It should be here explained, also, that these chances had been taken without damage on four previous occasions. It must be remembered that these men were grappling with a new and

gigantic problem. As in all such cases, emergencies arose which had to be settled as they arose and in the best manner possible under the circumstances. When the original head-gate was put in at the first intake by the well-known irrigationist, Chaffey,* who was then the director of the company's practical affairs, he claimed that he could not follow Mr. Rockwood's plan which required the floor of the gate to be at 100 feet, even, above sea-level. He said that on account of the difficulty of sinking the floor in the quicksand it could not be placed so low, and without Mr. Rockwood's knowledge or consent built it so that its effective floor level was 105 feet. The low water elevation of the river opposite this gate is 108.2, or only 3.2 feet above the floor. Sufficient water at this depth could not be forced through the gate to prevent silting of the canal below.

To overcome this difficulty a "by-pass" was cut each year around the head-gate in order to secure a sufficient flow, and these by-passes, or temporary expedients, were always closed up before high water.

The canal now cut below the silted-up portion was simply another of these temporary expedients, and had nothing unusual occurred nothing would have been said except praise for the engineer whose daring had saved a large population and enterprise from ruin. In this case, however, the unprecedented happened. A flood came in December, followed at short intervals by others of constantly increasing volume. The canal banks near the river were washed away and the canal greatly enlarged. Strong efforts were made at this time to close up the break. Piling was driven in, the size generally used being 6x6 with a few 8x8 and 10x10 with brace piling to hold the sacks of earth and the brush in place. The high water and lack of adequate supplies retarded the work, though twice the break was repaired to within about six feet. Just at the critical juncture the hoisting machine of the dipper-dredger, which was working day and night throwing in dirt, broke, and during the half day that it took to repair it the flood washed out a hole large enough to contain the whole dredger. The time thus lost could not be regained, and in Los Angeles, at the head office, it was deemed that all the damage that could be done was already accomplished and it

* See Appendix, page 536.

was decided to allow the break to remain as it was until low water.

This was a fatal mistake. Had the engineer's solicitations been heeded and one more determined effort made to forward immediately the needed supplies the opening could have been closed with comparative ease and the great future damage prevented. For, as the floods continued, the temporary canal was not only growing wider but deeper. From an original fifty feet wide and five feet deep it grew to several hundred, and the force of the great volume of water scoured out the channel to considerable depth.

In April, 1905, the head of the Irrigation Company saw his serious mistake. He and the chief engineer began to solicit the Southern Pacific Company for funds, offering them a strong hand in the management of the Development Company if they would take hold.

While these negotiations were pending, another effort was made to close up the break, but it failed and was abandoned in the following month.

In the meantime the water users in the Imperial Valley known as Imperial Water Company No. 1, were growing more and more nervous as each day continued with the water pouring into the Salton Sea. They did not fully understand the situation, and as is well known, unknown dangers are generally more distressing than those we understand. At their earnest solicitation, backed up by an offer of $5,000 advance in funds for the purpose, the president of the company, against the advice of his engineers, decided to make another attempt in May. The engineers argued that an attempt against a certainly rising river would inevitably result in failure. The Southern Pacific advanced some material to aid in this effort (for which it has since been paid), and under the direction of Mr. C. N. Perry, one of the engineers, the work was begun. It consisted of a double row of sixty-foot piles. The rows were placed twenty feet apart and the piles driven at five-foot intervals. The space between the rows was filled with fascines weighted down with sacks of earth. The summer floods were rising, however, and before this work could be completed the waters rose over the banks of the river, making it impossible to get either brush for

fascines or earth to fill the sacks, and all work was temporarily abandoned, and on Mr. Rockwood's return from the East, June 14, it was given up completely.

The accompanying diagram will give the location of the intakes. Intake No. 1 is where the old head-gate was placed, which soon became choked up with detritus and was used only during high water, as at low water it was some four or five feet below water level. Intake No. 2 was cut on the Mexican side of the boundary, to conform with a provision of the Mexican charter to the Irrigation Company. It was practically unused. Intake No. 3 is the "temporary cut" which has caused all the trouble. It was the intention of Chief Engineer Rockwood, when this cut was made, to place therein, as speedily as funds would allow, the necessary head-gate required, so that this would have become the permanent intake, properly under control, required by the Mexican concession. It was also his intention, constantly expressed, to construct a permanent and sufficient head-gate at or near Intake No. 1; and, as will be seen shortly, these two are the major propositions upon which the company are now vigorously working.

As a matter of important history I deem it wise to briefly recount the later efforts made to close the cut. From the second diagram the location of the respective endeavors is shown.

When work on closing up Intake No. 3 began in May, 1905, the cut was about 100 feet in width. When the water subsided it had grown to 800 feet in width, and was still carrying about 14,000 cubic feet of water per second, with a depth at one point of twenty-four feet.

On July 18 the Yuma gage showed 121.8 feet, with 18,000 cubic feet flowing through the intake, and only 7,000 passing down the old river channel to the gulf.

A new attempt was now to be made to control the water. A site was chosen a mile above the former one. By reference to the diagram, it will be seen that an island divides the Colorado River channel opposite Intake 3. This island is about 3,000 feet long by 1,200 feet wide. The plan now proposed was to construct a light jetty of piling and brush, beginning at a point on the Mexican side marked *A*, and continuing to a point on this island marked *B*. The idea in this effort was to control the river

by the formation of a sand-bar behind the brush, thereby diverting the main portion of the flow to the Arizona or eastern channel of the island. The experiment failed. In the meantime preparations were under way for a more ambitious undertaking. In August materials were ordered for the new attempt. This involved the construction of a gate at Intake 3 large enough to pass the entire flow of the river at low stage, after building which it was the intention to construct a permanent dam across the rapidly widening "cut." When this dam was secure the gate would have been closed, thus raising the water and throwing it down the old channel. This gate it was proposed to make the one required by the Mexican government. The floor was to be of concrete three feet in thickness on a pile foundation. The superstructure was to be of wood temporarily, but ultimately to be replaced by concrete.

No. 1 Diagram showing location of different canal intakes

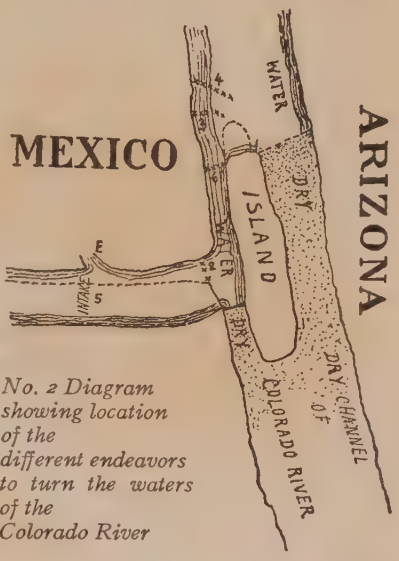
A two-yard dipper-dredge was at once set to work excavating a big channel to carry the water around the Rockwood Gate site, as marked *E* on Diagram 2, and the steamer ran around this pass while work on the dam progressed. This consisted of piles driven at the point marked 5 on Diagram 2. These were taken completely across the channel, capped, and a runway built on them from one side to the other. The steamer hauled gravel for a week to make a bottom around the piling, and the cutting of 150 tons of brush for the fascines was rapidly proceeding. All

Photo. by George Wharton James

THE DRY BED OF THE COLORADO RIVER, JUST BELOW THE "CUT"

the material was on the ground for the new structure, and it seemed on a fair way to be successful, when orders came from headquarters to stop the work. The water was rising so rapidly at Salton that some other expedient must be tried at once requiring less time, and thereby saving the complete washing away of the railway tracks. This endeavor is known as No. 5.

The Southern Pacific engineers proposed the construction of a pile-dam across the west channel, near the head of the island at the point marked 6 on Diagram 2 in order to force the water down the east channel. The west channel was here 650 feet wide and about 10 feet in maximum depth. A dam was to be built of woven wire cable mats, filled in with bundles of brush and barbed wire anchored in the river with piling. When completed it would have to withstand a water pressure of sixteen feet. Work was begun in the middle of the channel, and with two pile-drivers and a large force of men rushed as much as possible.



No. 2 Diagram showing location of the different endeavors to turn the waters of the Colorado River

All progressed favorably until the piling and mats reached within a hundred feet of the shore on both sides. As the work was nearing completion water was raised in the old river channel on the west side fully fourteen inches. No matter how much weight was put on the mats to prevent scouring, the water would get under them and cut away the channel. The island, on which all hopes depended, began to wash away. On the twenty-ninth of November the severest flood since February, 1891, swept down the river with resistless force, and carried away a portion of the work and much of the equipment. The island was completely flooded, and 240 workmen, thirteen wagons, a car-load of hay, another of

provisions, and thirty-eight head of horses had to be transferred to a barge instanter, or they, too, would have been swept away.

This was the sixth and last effort prior to the one upon which work is now progressing. The present plan includes the construction of a permanent head-gate at point marked *M* on Diagram 1. This is four miles up the river from the lower intake, and on the United States side of the boundary. The anchoring foundation is solid rock, and the structure is of reinforced concrete. It is 185 feet wide and twenty-six feet high above the sill. The floor is placed eleven feet below the low-water mark and four feet below the river's bed. It has 154 feet of water openings, and at the lowest water stage of the river can pass 7,000 cubic feet per second.

It is composed of twelve reinforced concrete cells about sixteen feet wide by fourteen feet high. These are filled with rock, gravel, and sand, which will be fully ample to make the structure stable, so that it will withstand the pressure of the heavy floods.

On March 20 the excavations were all completed, the concrete work actually begun, and in September everything was completed and the massive gate ready for service. It will carry 7,000 feet of water per second, while the flow of the Colorado at low water is only about 5,000 feet, and sometimes as low as 3,500 feet per second. The building of this gate implied the widening and deepening of the old canal, which is but eighty feet wide, and at low water can carry but two feet in depth. This is being enlarged to 170 feet wide and eleven feet deep (see dotted line *N*, Diagram 1) below low water. This work involved the excavation of 1,800,000 yards of earth.

The permanent work at Intake 3 was resumed near the point where it was abandoned last year (Diagram 1, *P*) with the necessary enlargements and alterations caused by the changes brought about in the interval by the power of the stream. This is practically a resumption of endeavor No. 5. The floor of the new gate is 200 feet wide and sixty feet long. It is placed eleven feet below the extreme low-water level in a quicksand formation, and anchored to 533 foundation piles. Aprons thirty feet in length extend from the floor to the coffer-dam wall, and wings 100 feet in length extend up and down the stream. Nearly 600,000 feet of

lumber, including 1,680 lineal feet of sheet piling wall, six inches thick, driven from twelve to twenty-two feet, are used in its construction and protective works. Eight hundred and fifteen round piles are used in the foundations, wings, and diversion jetty.

The earthwork in the approaches to the gate involved the moving of 120,000 cubic yards of earth in excavating an average distance of 350 feet, and the fill in the diversion dam and levees contains 59,600 cubic yards of earth, 2,000 cubic yards of brush, and 20,000 grain-sacks filled with gravel.

It was decided on the seventeenth of December, 1905, to resume this work. New material had to be ordered, as all the original supply had been removed to carry on the work which the November flood had destroyed. On the eighth of January, 1906, work on the walls of the coffer-dam began. This is 250 x 120 feet, and contains 740 sheet piles 6 x 12 inches, twenty-two feet long. It was completed and the earth within excavated on the fifteenth of February. An eight-inch and a six-inch centrifugal pump were set to work, and lowered the water as far as was necessary in two days' time. The eight-inch pump kept it at a proper level, while a large force of men worked day and night.

While work on this gate, known as the Rockwood Gate, was progressing, equally energetic preparations were being made for work on the great dam to close the rapidly widening cut near by. When the cut was first made it was fifty feet wide and five feet deep. In November, 1905, it was 300 feet wide; in March, 1906, 650 feet; in April, over a thousand, and in September, when the actual work of closing began, over 4,000 feet. A railroad spur was built, thirteen miles long, from Pilot Knob to bring down solid rock to help fill up the gap; thousands of men and teams were engaged, and day and night the work never ceased.

The Rockwood Gate was completed, and the pile-driving, mat-laying, and rock and earth dumping began simultaneously on each side of the cut, when, on Thursday, October 11, an extra flood of water came rushing down the river and carried away part of the gate. This, at first, seemed another almost fatal blow, but, with resolution, the engineers hammered away, repaired a railway trestle that crossed the river below the gate, and began to fill up the gate space with solid rock. Every railroad quarry

within a distance of 300 miles is supplying rock which is being hauled to the spot as fast as engines can take it. A second trestle is being built beside the first to aid in the speedy dumping of the rock.

As an additional precaution a railway spur is being built to the concrete gate, Intake No. 1, so that should it be necessary another dam will be constructed across the river at that point to divert the whole of the Colorado through the gate and thus into the canal, while the work of closing the break below is completed.

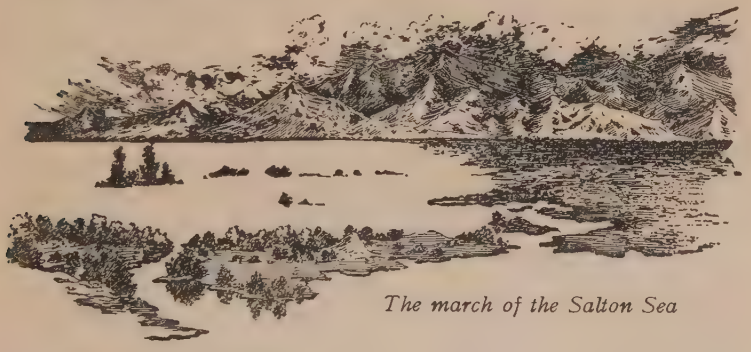
Here, then, the matter stands at the present moment of writing, October 20, 1906. The concrete gate at Intake No. 1 is completed. The canal from that point is being widened and deepened. The break in the Rockwood Gate is being filled in with rock. The gap near the Rockwood Gate is being closed on both sides, and if the dam holds the great work will be done, and the Colorado River once more tamed, bitted, and controlled.

It was in March, 1906, that I visited the Salton Sea for the first time since its last uprising. There, with the water flowing over the railway tracks, I saw miles of telegraph-wires stretching over a sea where once was the dry Le Conte playa, the telegraph-poles standing in several feet of water.

It was with a singular feeling that I saw the slowly oncoming waters drive back the tokens of an advancing civilization. When the railway tracks were laid they went directly through a large portion of the below-sea-level area. The flooding therefore was inevitable.

As I stood there on the half-submerged track at Mortmere, I read the now neglected railway-siding sign, "Mortmere To San Francisco 630 7-10 miles," standing in several feet of water. Close by was a group of tules, several budding cottonwood trees, willows and arrow-weed, formed by the overflow from the useless wells. The wind blew the waves between the track and the sign, and the wash fell upon the ear with rhythmic regularity. With calm complacency the sun sent its glistening path of burnished gold over to the nether edge of the sea, while mocking-birds and linnets sang as merrily as if the washing away of forty miles of railroad track and the submerging of the telegraph-wires were an ordinary occurrence.

But that wash of the sea. As I sat down and listened to it my thoughts rambled away from the desert. I was no longer in a waste region. I was on the sea, where monster freight steamers and sailing vessels shouldered their way through the blue waves. I heard the merry music of the orchestra on the pleasure steamers, and the dull thud of the engines and the throb of the revolving screw of a great transatlantic liner. For a long time I thus sat until in my dreams I heard the voice of my friend asking how much longer I intended to sit there. And then I found that the "wash of the desert sea" had led my mind captive and there in the heart of the Colorado Desert I had been enjoying again the experiences of past transatlantic voyages. A sea in the desert! How strange! It was wonderful, unique, never to be forgotten.



The march of the Salton Sea

In June and July the flood was so high that both Calexico and Mexicali suffered considerably, houses and stores being actually washed into the widened and deepened channel of New River. A railway is now built from Pilot Knob to the intake, a distance of twelve miles, so as to render the handling of the necessary supplies much more easy, and also to convey rock, of which the Knob is composed, to act as a filler for the dam. Everything is now ready waiting for the lowering of the water. Men and teams in great number are on hand. The intention is to have piles ready for driving, wire mats ready for lowering into position, and begin the work on both sides at once, gradually narrowing the channel until the two portions of the dam will meet in the center and the rush of water will cease.

It was early in March we made the trip from Yuma down the overflow to the Salton Sea, and the latter part of the month when we went back to the sea to get our boat and supplies. On June 11 and 12 I again visited the sea with the hope of finding my anchored boat. A naphtha launch and its engineer had been kindly placed at my disposal, and with my assistant, Mr. Van Anderson, we practically circumnavigated the whole sea. The night of my arrival I slept at the new Salton station. Everything was still and silent when I went to bed, save the soft purring of the telegraph-wires. But during the night the waves began to roar and by morning one could easily have thought himself by the side of the ocean. The sea, which was without a ripple the night before, save here and there where a fish jumped out of the water, was now very rough.

The pelicans of Pelican Island, Salton Sea

On the Salton Sea the prevailing winds are from the west, and these winds generally come up after sunrise. The lake, though it looks quiet enough from the distance, is then lashed into heavy waves, many of them with white caps, and a heavy rolling ground-swell adds to the discomfort and hindrance of the rower unwary enough to be out in a boat at such a time.

During the day it is hard for a stranger to tell where the sea merges into the mirages. None but a trained eye can detect the change, and that more because of perfect familiarity with the metes and bounds of the sea than because of any real and perceptible difference between real and mirage water.

But when the sun goes down behind the San Jacinto range, shooting its darts and floods of gold through narrow peaks and wide canyon gorges, then, then is the time to sit and enjoy the exquisite and placid beauty of the Salton Sea. Geneva is not more picturesque, save for its fringes of trees, nor Galilee more

Photo. by George Wharton James

ON PELICAN ISLAND. THE SALTON SEA

blue, and Windermere, save for its historic memories, would be less attractive. Even Tahoe, superb mountain lake of the High Sierras, needs to look well to its laurels, for this parvenu modern sea, — small reminder of its grand and extensive prehistoric ancestor, — desert, foot-hill, and mountain surrounded, has its own fascinations and charms, some of them peculiar, some weird, some fantastic, some mysterious, but some exquisitely beautiful that take hold of the esthetic senses as well as the imagination and hold them in bondage.

The name, Salton Sea, has had much to do in furthering the false ideas that people have had of its being a salt-water lake. When the waters of the Colorado first began to pour in down the

Nesting pelicans, Pelican Island, Salton Sea

beds of the New and Alamo Rivers, the vast, uncovered, and loosened up beds of salt at the New Liverpool Salt-Works naturally made the water very saline. But as the inflow continued, the proportion of salt in solution became much less, so that now one may drink of it without inconvenience. Often on the deserts of Arizona and New Mexico have I had to drink water twice or thrice as brackish as this of the Salton.

A little incident observed by Mr. Van Anderson illustrates the pathetic struggle for life such untoward events bring upon even the lower animals. As the launch was cruising among the partially submerged mesquites near Fig Tree John's, he observed, clinging to the uppermost branches of a mesquite, with the waters not a foot away, a poor, starved-looking kangaroo-rat. Its head

bent forward, with protruding eyes fixed intently upon the water, we had to shout twice ere it looked up and then only to give to us a momentary, pitiful look.

How long it had been there we have no means of knowing. Its fate, however, is certain unless some friendly log comes floating by and affords an opportunity for escaping to the dry land. Otherwise the poor little creature will undoubtedly stay until it either falls into the water through fatigue and want of food, or it is submerged by the rising tide.

When the Salton Sea first began to rise, ducks, geese, mudhens, sea-gulls, and pelicans appeared literally by the thousands. It was not long, however, before the ducks and geese disappeared, and only the birds unfit for food remained. These also left when the flood subsided, but in December, 1905, and January, 1906, great quantities returned, and the pelicans still remain, having taken possession of the newly made island, near to where we first cached our supplies, which they have made their nesting and breeding place.

When our launch approached we saw thousands of pelicans sitting on the rough and irregular slopes of the island. They had scooped out small basins in the gravel and rocky places and therein had deposited their eggs. As we landed they reluctantly flew away, almost hiding the sky as they passed over us. Eggs by the thousand were to be seen, from one to five in a nest, though generally there were but two. In a number of nests the young were already hatched and a more hideous-looking set of bald-bodied creatures I never saw, their large heads and heavy bills adding to their awkward appearance. In the distance the flocks of older birds had settled, making the sea white and dazzling with their clean and well-kept plumage. Will this newly formed Pelican Island remain an island, or will it cease to be one? It can cease to be an island by the subsidence of the waters that made it into one, or it can cease to be an island by being completely submerged by the inflow of more water. The question, which will it be? will soon be answered.[1]

[1] A despatch from the author, dated November 5, 1906, states that practically all the water has been turned into its old course by the dam at Rockwood Gate.

Photo. by George Wharton James

BUILDING THE CONCRETE DAM ON THE COLORADO RIVER. INTAKE NO. 1

CHAPTER XXXVII

What the Desert Offers to the Invalid

IF what I have already written in the pages of this book has not thoroughly convinced the unprejudiced reader that the desert is a wonderful natural restorer to health nothing I can specially say will have that effect.

The purity of the atmosphere, the healing properties of the desert plants, the freedom from all ordinary infection, the desiccating and aseptic qualities of direct sunlight, the absence of all city distractions,— these and a score of other equally potent factors all make for health.

Indio has long been heralded as a specially healthful place. The discovery of the pure and delicious artesian water was an additional factor in its favor. A few years ago Mr. N. O. Nelson of Leclaire, Illinois, well known as an employer of labor who believed in copartnership and profit-sharing with his employees, bought one hundred and sixty acres just northeast of Indio, and there established a Health Camp. It consists of tents with board floors and wings, and for a trifling sum any one may come and have the privilege of using them. A meal tent is also established, where, except in the hotter months of summer, meals are served of good, healthful quality at the minimum of price. The camp has its own water supply from an artesian well on the farm. Several cows also are kept and plenty of good fresh milk supplied to the invalids. As yet the camp is a drain upon Mr. Nelson's purse, which he gladly bears for the benefit it is to those who would not fare so well without it.

But a large dream I have long cherished is that a sanitarium for those who are in the *earlier stages* of pulmonary and bronchial affections should be established, where a small fruit farm would give a little light employment each day to the sick ones, where pleasant companionship would be possible, healthful

amusements provided, both indoors and out, excellent meals of the right kinds served and everything done that could be done to give to those who were just beginning to suffer from these evils all the *natural* benefits of the desert, with the needful medical and home care.

That such a sanitarium will ultimately be established I have both hope and faith, when the man or woman is found who deems help to suffering humanity a good enough investment for a score or two of thousands of dollars. I know where devoted men and women of the medical profession, and good nurses of both sexes, can be found to conduct such an establishment were it founded and financed, and erelong, I fervently believe, the needful in money will not be lacking.

CHAPTER XXXVIII

Suggestions for the Desert Tenderfoot

To be a "tenderfoot" anywhere is uncomfortable, irritating, and sometimes disastrous. To be one on the desert is often to court disaster and even death.

In the first place the tenderfoot should never take his first desert experience in summer. Let him begin in winter when it is cooler and there is less danger from scarcity of water. In starting out from the railway afoot, with burros or driving, be sure and know all that you can possibly learn of your roads. Get maps drawn if possible. Know the places where other roads turn off and where water is to be had.

But I wish to make suggestions only for the desert tramper, who goes alone or with companions, and with one faithful burro on which he packs his unpretentious outfit. He is going away from the beaten track, out on some of the trail trips I have written about herein.

The only personal necessaries for a desert trip are comb (no brush), towels, soap, toothbrush, and pocket-knife. It is well also for each man to see that he has knife and fork, spoon, and agate-ware cup and plate. These can be kept in a small canvas sack. All heavy personal equipments must be resolutely excluded.

A little strong twine is often convenient in one's hip pocket.

In starting out on a warm day don't be prevailed upon to leave your coat with the idea that it will be so hot on the desert that you will not need it. As a rule the mornings are cool, sometimes cold, and changes of temperature on the desert are so marked as to often cause great inconvenience, especially to one not acclimated.

For clothing, a strong khaki or corduroy suit, with plenty of pockets for note-book, etc., is good. See that every pocket is extra strong, so that if things are picked up and put into them they will not give way. In the coat it is well to have pockets with flaps that button down, so that if one sheds his coat and puts it on the burro's pack it can be tied loosely on the outside, handy to get at, with little fear of losing the contents.

Wear shoes with tops to them that lace up so as to keep gravel and sand out. If you expect to do any tramping be sure and have plenty of hobnails put into your shoes. Ordinary leather soles are cut to pieces on some of the granite gravel of the desert in a week's time. Take strong strips of buckskin for laces, and always have an extra pair along.

Take along a case of my rattlesnake remedies and one of the pamphlets in which I describe the action of the poison and how to overcome it. An ounce of prevention is better than a pound of cure, but where one can't be sure of prevention he can at least be forearmed against danger.

Each man should have his own canteen, be personally responsible for it, and stick to it as closely as he possibly can. Never leave a man without a canteen of water, unless he is where a supply is to be had.

It is always well to have a good map of the region in which you are to travel. Of some parts of the desert mountains the Geological Survey has published maps, but for the worst portions — those east and southeast from the railway — the best map I know is the one made expressly for this volume.

For the stock, provide a pair of hobbles for each animal, with an extra pair in case one is lost or injured.

See that pack ropes are new and strong. Take an extra one. Tie-ropes the same, with an extra one or two. Provide also nose-sacks to feed grain to mules or burros. These can be made by slitting down each side of a gunny-sack, leaving the two outer edges as strings to tie over the animal's ears. These take up less room than leather or canvas nose-sacks.

Take a small pot of ointment for saddle-galls or wounds.

Enough grain to give each animal a quart-feed three times a day for the whole trip (if possible).

I suppose every camp has its own rules, but there are some that strike me as of universal application. Anyhow they are the invariable rules of my camps, wherever they may be.

On a camping trip there must be but one boss.

Obedience to that boss must be prompt, effective, and cheerful.

Kicking, complaining, whining are absolutely forbidden under penalty of being sent back. A whining companion on a camping trip is an unmitigated nuisance. He is as the pear blight which kills both leaf and fruit; as the scale which covers the orange and its leaves with a hideous black smut which smothers the life of the tree as well. The whimperer's whines literally cover the mind and soul of his companions with a blackness that can be felt and he kills all the spontaneity, the joy, the pleasure of the party. If a man can't accept the hardships of a trip without playing the baby, send him back home on the instant. I am merciless with such mortals, for I have found by long years of painful experience that to humor the whimperer, to endeavor to please or conciliate him, to try to make things easier, is but to add another lash to the whip with which he scourges you. Like jealousy, the more tolerant you are of whimpering the worse it becomes. The best plan is to kill it at once.

Everybody feels hardship, but the *man* bears it and says nothing, except perhaps to laugh at it. The whimperer sits and pities himself and then rails at misfortune, at his comrades, at himself, at everything and everybody because he didn't stay at home. Then, ye gods, is the time to rise and smite him hip and thigh. No matter at what trouble or expense, SEND HIM HOME!

In saddling the burros let every man learn to do his share. The first thing is to know how to put a saddle-blanket on properly. Remember it is to be between your animal's back and his heavy load, all day, up and down all kinds of places. There must be no wrinkles or creases, and the saddle must rest easily upon it.

In packing the burros remember that each side must be about equal in weight. Study this thoughtfully and make the loads in the kyacks balance as nearly as possible. This avoids saddle-sagging, chafing, and the possibility of the saddle's turning.

Learn to throw every kind of a hitch that will keep your pack on the most securely. I know three or four hitches equal to the

much vaunted "diamond." Get an expert to teach you all he knows and go on learning.

Each man should fold up his bedding as speedily as possible in the morning that it may be ready for packing when the burros or mules are saddled.

Help all you can to make an early start. One hour before seven in the morning is worth three hours after two in the afternoon.

As a rule things pertaining to the commissary are determined by the boss. But one or two things it is well to remember. It often saves one from making unreasonable requests. In packing remember to place everything handy. Have a place for everything and keep it there, so that if needs be or emergencies arise, you can get it certainly at a moment's notice.

Then, too, in making ties remember they have to be untied. Make every knot with the thought, how can this be best made secure so that it can be untied the easiest?

Open no canned goods that cannot be eaten at one meal. Canned is pronounced "condemned" after one meal.

Cut not a slice of bread more than can be eaten.

Let each man cut his own piece of cheese.

Food waste in camp is a thing to be abhorred and unforgiven.

Never be extravagant with water, and never throw away poor water "in expectation" of getting better. Keep what you have until the better water is actually before you.

On reaching camp at night always look out for a place to sleep as early as possible. It is not always easy to find a good spot after dark. Your blankets placed on a spot, or your hat, is the camp notice of location and is always respected.

Where there is a party, let each man do his camp duty promptly, as for instance on arrival at camp, the gathering of wood, the building of fire, the unpacking of animals, etc. Much friction is saved where one man doesn't have to wait until a lazy or indifferent man does what he should have done promptly.

If you are keeping notes of the trip, seize every opportunity to write them up. There is nothing more deceptive and elusive than yesterday's notes written to-morrow. Write up religiously each night before going to bed.

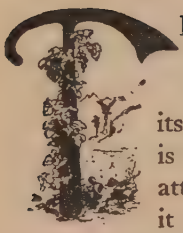
When sleep time comes be sure you are in peace and harmony with all your fellow campers and the world at large. Quit talking when others are trying to sleep. Be thoughtful for them. They may need more or earlier sleep than you. Respect everything in others that ministers to their health, comfort, and legitimate pleasure, and others will be likely to do the same by you. Lie down to sleep then in peace and content. Don't fidget and don't be afraid. See that you have all the blankets you are allowed to take, for what you don't need over you, you can put under you. If it grows cold during the night, have your blankets so arranged that in a moment you can get in "lower down" and thus have another covering over you.

You will sleep as you never sleep indoors, and if you avoid eating and drinking too much your day's tramp or ride will give you dreamless sleep. You will stretch out, think a few moments, sleep a very short time (it will seem) and to-morrow will have come.

Indian school in Banning reservation

CHAPTER XXXIX

The Lure of the Desert



HE desert calls with insistent voice to many and diverse minds. It has a fascination, a charm that grows more potent the more one is subject to its influence. To average persons this attractiveness is a mystery,—the desert to them is everything but attractive. And it cannot be denied that, at times, it is terrible and appalling. It is a giant monster, cruel and bloodthirsty, hungry for men and women, whom it slays as ruthlessly as the giants of a dream slay all who stand in their way. Its mountains are sometimes the restraining, confining walls of a dreadful prison; its springs,—alkali, bitter, and nauseating; its sand plains,—traps for the unwary, where no one can wander without getting lost; its mirages,—devilish contrivances to lure men where, tortured with consuming thirst, they are tantalized to death by visions of living springs that disappear as they seek to drink; while piles of bleaching bones, grinning skulls, and shapeless masses on which revolting vultures are still making their frightful banquets, cry out to the fainting spirits and tell of the fate that awaits and will soon overtake them.

Even a cursory study of the desert reveals a place of tears, a place of sorrows, pains, anguish, and distress, a place of travail and birth, a place of delirium and death. Tears enough have fallen upon it to make a river; the groans and cries of the dying have piled up higher than the surrounding mountains; and curses, loud and heavy, have penetrated deeper than the hidden water supply that flows far under its surface.

So the desert stands before us as a place of contradictions, a place of sharply defined contrasts. In its physical contour and its surroundings this is self-evident. Here as nowhere else are

to be seen and felt the contrasts of height and depth, of light and shadow, of heat and coldness, of barrenness and fertility, of aboriginal man and his most cultivated brother, of primitive agricultural methods and the most advanced. Here are the most prickly trees and shrubs clothed in the most perfect of earthly blossoms, sent by the good God to give the desert hell some of the joy of His floral heaven. Here are the most deadly reptiles clothed in silky and luminous garments of superlative pattern, and animals the swiftest and most agile, as the antelope, deer, mountain lion, and mountain-sheep, and the most slow, as the turtle and the lazy heloderma. In everything the desert stretches wide, expands far, reaches high, descends low. It is all-inclusive, all-embracing, and so it calls forth homage of every thinking and sentient heart that is willing to come under its influence.

In the desert I find myself continually asking the question: Is it a vestal virgin, capable of all the rich beauty and glorious fullness of a completed life, or is it an old woman, worn out, hideous, and ugly, after a life the sweetness and beauty of which have been burned out by evil passions?

Sometimes it seems the one, sometimes the other. In the early morn when all is bright and beautiful, glorious and invigorating, one feels as the morning stars must feel when they sing together in very exuberance at the joy of being, and then, when fierce noontide with its burning, scorching heat falls upon the wearied body, all life seems gone, all vigor, all joy.

At times the desert speaks to the soul and says: Here all is stable and firm. Body, mind, and soul alike can find rest. The mountains are immovable, the canyons are cut forever, the sandy stretches can never change, the desert distances can never be brought nearer. Then comes the whirling sand-storm, the fierce cloudburst, the turbulent and destructive river, the earthquake, and everything in the desert speaks of change. Here is nothing stable. Every created thing must journey on to the goal set by God.

That preacher has not yet appeared on earth who can speak to the human heart as forcefully as the desert speaks. Many a world-famed pulpit orator has given forth many an error, — "the

blind leading the blind," — but the desert never gives out a false note. In its vocal silence it compels every human soul back upon itself, back to God. Then Truth, pure and unadulterated, flows into the empty soul and men become strong as were Moses, Elijah, Jesus, and Mahomet, after their desert experiences.

Then, too, the desert typifies life. It leads you on to know more. Satisfied or dissatisfied, content or discontent, joyous or sorrowful, peaceful or restless, you cannot stop, you cannot cease, you cannot be still. The solitude, full of wild and weird mysteries, beckons to you. The mountains in their grim austerity call you. The canyons in their studious secrecy whet your curiosity. You must see; you must learn; you must know. Though you have suffered in the past, though the journeyings have been full of weary labor, though you have been well nigh parched with thirst, almost dead with fatigue, often lost and oftener distressed with fears of being lost, you are overpowered and overwhelmed with a desire to continue, to search for more, to see, know, experience all there is. *All*, though it be terrible; ALL, though it mean suffering; ALL, though with it comes Death! For there may be that come which will absorb all terror, all suffering, even death itself and make one glad. The heart cries out: "Give it all to me! Let me taste the whole of it. I am a man, a god though in the germ. I will triumph over all earthly things, — things of horror, of terror, of weariness, of exhaustion, of mystery, of joy, of sorrow, of pain, — even death shall be conquered, for within me is Life."

The desert fills one with this passion to know, and in knowing to conquer. Its cry, like that of Life, is irresistible.

In the desert, too, all things seem possible. Here is the primeval chaos out of which the world of beauty and habitation has been made.

Here is the naked *body* of things, and it suggests with terrific force what the naked *soul* of things is. The greatness, the vastness, the chaos, the crudeness, the palpitating power and vitality appeal to one as do trumpet blasts out of an unearthly silence. In gazing on the desert you are gazing at your own undeveloped soul.

And at the same time in the presence of the tremendous sunlight, the awful distances of the stars, the unseeable stretches of the earth, the towering grandeur of the mountains, the vibrating silences, the overwhelming possibilities of the desert, you feel a corresponding enlargement within. Your own soul enlarges to meet these things, and you feel within yourself a tremendous potentiality which may become something noble and grand, even sublime.

For is it not to widen *man* that wide stretch these apparently illimitable plains? Is it not to expand him that everything on the desert is expansive? Is it not to heighten him that the mountain peaks tower to the sky? Is it not to deepen him that precipices yawn, that canyon depths call upon the awe of the human soul?

How earth and heaven meet on the desert! In the far-away blue on the remote horizon the yearning heaven reaches down to the emulous earth, and they become one. So God reaches down and joins himself to man, when the creature, in his noble aspirations, reaches upward to the Creator. Thus man becomes as God, able to do all things, as Christ said he should.

For the desert teaches us that God is no niggard. It gives lavishly and bounteously of all it possesses. The sun is never so brilliant and glorious, and its risings and settings so gorgeous as in the desert. Daily, nightly, entrancing color schemes are presented to the visitor, in a wild prodigality that would be startling were there not so many other prodigal gifts to engage the attention. The sky is never so clear and blue elsewhere, the stars never so luminous and soulful, the breezes never so cooling, calming, and refreshing when evening falls, the sleep never so dreamless, the mind never so clear, the soul never so pure as on the desert.

Is it not possible that one source of the attractiveness of the desert is found in the fact that it seems to echo what often we vaguely feel within ourselves? What vast mysteries are there not hidden in our own breasts, what towering snow-clad mountain peaks of goodness, what deep, dark canyons of evil? And how the storms rage within our own souls! Was there ever a wind-storm or a sand-storm on the desert equal to the storms that sometimes

rage tempestuously within the human heart? And yet, just as men have been impelled to change the adverse conditions of the desert, so the desert calls upon us to change the adverse within our own souls. The sand-hills, the unfruitful soil, the great valley stretches, must be turned into gardens of Eden in which one may walk and talk with God and commune with angelic and human companions. The desolation must be changed into fruitfulness, the horror into beauty, the unrest into peace, the evil into good, the weakness into strength, even as God hath willed from the foundation of the world.

The desert is nothing if it is not sincere. It is sincere to brutality. Open, bare, exposed it lies, and yet it is not dead. It is alive with a fiery aliveness that takes you into its heart and compels you to be as it is, open, frank, sincere. Only then can one know freedom. Of this there is none when one's very self is fettered by the lies, the petty pretenses, the insincerities, the glozings that men and women perpetrate one upon another. Oh, for the freedom of soul that comes from absolute openness, as freedom of the body comes in the desert! And not only freedom of the body. Here the usual channels of one's thoughts lie unused and forgotten, being inadequate to hold the vast floods of spiritual life the desert pours into the receptive soul.

One's ordinary little round of ideas, one's little suppositions, one's little codes, one's little standards are crushed and trampled into nothingness by the tremendous truths the desert forces upon us. It is no respecter of persons, of human ideas, of human platitudes. It bows no knee to human logic or human laws. Its stern, grand face is lifted to the sky in constant search for God himself through the depths of space, and who shall say but that on that face are reflected some of God's greatest truths? Is this not one reason why the desert is such a bringer of peace and life? It gives to us, perhaps unconsciously, the assurance that Life and God are immeasurably greater than man has yet conceived.

This barrier that the desert places between the outer world and itself is a good thing for man. It calls to him to come and share this aloofness. On crossing the line you find yourself in a world where everything is different, entirely new! It is a complete separation, an absolute revocation of all former earth-claims.

The sun is different, so are the sky, the air, the trees, the distances, the clouds, the stars, the odors, the sunrise, the sunset, the mountains, the perspective, the *everything*.

Then there steals into the soul a similar sense of separation. You find a barrier betwixt yourself and many of the things you used to deem essential to your life. They are at once divorced from you. You do not need them, rely upon them, cling to them, as you did yesterday. You find how little you really need, how primitive and simple are the demands made upon you when you do come to the primitive and simple, and as a snake sheds its old and useless skin so you shed your useless garments of body, mind, and soul, of conventionality, artificiality, and unnaturalness. To some people this severance comes as a shock that deadens, a blow that stuns, to others as an arousement, an awakening, an enlargement, and a quickening.

There is no knowing of self in the whirl of cities. There is no solitude, no calm, no rest, no opportunity for deliberate self-appraisement according to the true standards of nature. Everything is conventional, fictitious, unnatural. Men are weighed by their money, their clothes, their geniality, their attainments in the arts and sciences, in business or in popularity, rather than by their character. Then, too, everything is haste. The clang of car-bells, the toot of automobile-horns, the whistle of railway-engines, the hurry, bustle, clangor, confusion of streets, are ever in their ears. There are the theaters, balls, concerts, churches, receptions, lectures, routs, picnics, and parties to aid further in the work of mental distraction. Can one think in such a babel, such a hell? There is little or no real thought in cities. We think we think, but just as city air is ever and always the breathed-over air of the millions and is full of the odors of shambles and markets and gas and decompositions and swill-barrels and alleys and stables, so are the thoughts of men conventional, bounded, set, second-hand thoughts flavored by the odors of tradition, of theology, of this and that and the other, — musty, rusty, moth-eaten, dog-eared, not fit to be mental and spiritual food for living men and women.

So then if you would know yourself, if you would really think, if you would let pure, real thought flow into you freely, get away from the cities. Go out away from man, now and again; ascend

the heights, descend the depths, measure the distances, track the pathless desert, for there, in the still places of God, will your soul learn to know itself and its great and wondrous destiny.

There are many points of similarity between the desert and the ocean. There is the same vastness, the same illimitableness, the same mystery. Yet wonderful differences exist. On the sea all is in motion; the vessels, the waves, the sky, and the stars, all are in apparent if not real motion, full of life and activity. The sea is ever restless, ever striving, ever seeking after that which it has not yet found. But the desert is so full of quietude, of calm completeness, of passionless serenity, that it soothes and calms as the hand of a healthy loving mother soothes her feverish child.

I love the absolute silence of the desert. Here it is no figure of speech to say that, at times, "you can hear nothing but your own heart beat," or "it is a silence that can be felt." Ah, and for how long has it been a silence? From the ages of the past to the now and the yet long distant future.

When one hears nothing but the mad cry of the world, and he is shut in between confining city walls, how his heart cries out for the silence and wide expansiveness of the desert!

How marvelous God's use of silence. He has spoken much in Nature and Revelation, yet it is unquestioned that all His best things are yet unspoken, His best thoughts unknown to man. Hence when men speak of being "natural" and that Nature demands freedom and fullness of expression, would they not do well to remember that silence is both natural and godlike, and that man should aspire to the latter as well as the former? There, golden silence flows out of the heart of the sun, and as it fills the earth with its splendor and sublimity it seems to fill man with the same fiery heat, impetuous ardor, glowing courage, and godlike aspiration that sends the chariot of day speeding each morning across the heavens.

But silence speaks of solitude, and to some persons there is an oppressive sense of sadness wherever human beings are absent Solitude is so awful to them. It seems as if some dreadful thing had driven humanity away, and therefore the place of solitude is filled with vague, mysterious, but nevertheless potent fears.

What human being is there who has not felt the desolation of

loneliness, the sorrow and pain of solitude, the aloneness that comes at times, even when mingling with the madding crowd, and that makes us feel the aloofness of our own soul? Is not one secret of the power of the desert found in its almost visible personification of this feeling? It is the forsaken, the desolate, the solitary, the alone, and without knowing it, we pity ourselves in pitying the majesty of its aloofness. Some men flee to solitude through bitterness of spirit, through hatred of the world, because of disappointment, blight, or sorrow. Others go because in the vastness of the desert the spirit finds freedom and enlargement, and hence peace.

Sit with me now on a mountainside looking over the desert. The moon is rising. Below me, standing in awesome silence, are the hundreds of giant palms, their age telling me they should be sere, yellow, and hoary, yet their green and graceful crowns speaking of an aspiring youth that nothing can age. Beyond is the plain, sandy and strewn with boulders, dotted here and there with mesquite and lesser trees and shrubs. Farther away, like recumbent forms of sleeping monsters, rise the spurs of the giant mountains, which, leaping at once to the heavens, form steps for man to ascend and gods to descend. All are touched with the melancholy radiance of the moon. It is not a great blood-red orb, but a dainty, gentle presence, a silvery crescent that comes in maiden modesty to diffuse sweet and pure beauty on every hand. Everything is touched as with luminous primrose and silver. The silence of the desert is accentuated by the thousand and one sounds that tell of the things that do not sleep by night, — the gentle breeze playing quietly with the leafy mysteries of the palms, the rustling of tiny creatures in the sand, the occasional croak of a frog, or chirp of a cricket, and once in a while the perfect flood of melody from a love filled mocking-bird. How small and insignificant and unneeded man feels in such presences and at such a time! Without him or with him these things are just the same. He neither helps nor hinders, neither calls forth nor restrains. There are some things, thank God, that man cannot meddle with, improve, nor mar. They refuse to be civilized and will forever remain as examples of what can be achieved without his aid or interference.

So, alone, save for the all-embracing presence of God we lie down to sleep, content and peaceful as was the poet when "rocked in the cradle of the deep."

People who sleep indoors do not know what they miss. Think of sleeping within four solid walls, windows closed, blinds drawn, doors shut, and "cribb'd, cabin'd, confin'd" in a space 12 by 14 or so! Then compare this with the elastic walls of God's own desert solitudes, no windows, no doors, no blinds, and the ever moving winds playing with your hair, kissing your cheek, whispering sweet things in your ears, bringing sweet odors one after another to your senses, and then, with soft, soothing, mesmeric touch quieting all nervousness, stilling all alarm, quenching all fever, and tranquilizing all mental excitement so that sweet sleep falls upon you as easily and unconsciously as night falls upon day. Then if, during the night, the mocking-bird wakes you to listen to his exuberant song of love to his mate, as you listen you look up into the peerless abyss of pure turquoise where float liquid stars and feel their power as never before. Stars stir varying emotions in the human heart according to human moods. Sometimes they oppress one with their mystery, their vagueness, their far-away calmness as if they mocked all the efforts of puny man to know more of them. Sometimes they awaken such intense longings, such terrible aspirations, that human nature can scarce contain them, but to me they oftener bring a sympathetic presence of a supreme and loving power, a nearness of the Divine, the soft, sweet eyes of a loving but all powerful Father gazing with protecting care over me. To know and feel all these things is worth all the luxurious sleeping-chambers of all the ages. To know the joy of being enfolded in the tender yet strong, sympathetic yet stimulating, soothing yet arousing influences of all out-of-doors at night is worth all the soft and voluptuous couches of every king and czar that ever lived.

A CORRECTION

On page 507 a statement is made that places upon Mr. George Chaffey the ultimate blame for the flooding of the Salton Basin. This statement should be corrected.

In April, 1900, Mr. C. R. Rockwood, as president of the California Development Company, pursuant to the wishes of a majority of the promoters and chief stockholders of that company, entered into a contract with Mr. Chaffey whereby the latter was to be elected its President and General Manager and to have control of a majority of its stock and of its affairs for a period of five years. The company, up to this time, existed merely on paper and had not turned a spadeful of earth in practical construction work. He (Chaffey), by his contract, was to put in the necessary head-gate for the control of water from the Colorado River and construct the necessary canals to convey a stipulated amount of water to the Imperial Valley, and generally to finance the concern and put it on its feet, taking payment therefor chiefly in stock of the Development Company. Mr. Chaffey did put in the head-gate and construct the canal between April, 1900, and May 31, 1901. Whatever his critics may affirm as to his methods of conveying the water to the Imperial Valley, to the fact that he did so convey it is largely due the credit that a barren desert was soon converted into a veritable garden, and it should be noted that the works installed by Mr. Chaffey were in all respects sufficient to supply abundance of water to the settlers in the valley during the period that he was directing the company's affairs.

While Mr. Rockwood's name had been associated with the idea of promoting the enterprise for several years prior to Mr. Chaffey's connection with it, none of his engineering plans or ideas had been executed. Mr. Rockwood and Mr. Chaffey are now at issue as to the methods pursued by the latter to accomplish this result, but Mr. Chaffey asserts that while Mr. Rockwood doubtless had definite ideas of his own as to how the head-gate and canals were to be constructed and upon what lines they were to be run, he was, under his contract, in no way bound to carry out these ideas. He proceeded, therefore, to put in the head-gate where and how he pleased, fully intending, however, to place it even two feet lower than the gate Mr. Rockwood had intended to build. But just as Mr. Rockwood was caught by an unexpected flood in 1905, so he was caught by the spring flood in 1901, and, perforce, was compelled to complete the gate hurriedly at a level of 103 instead of 98 feet above sea level. He then resolved, the following season, to put in two supplementary gates, — one on each side of the gate already in, — but both at the 98-foot level. Before this time arrived, however, Mr. Chaffey had severed his connection with the Development Company, sold out his interests (Feb. 12, 1902), and hence disavows all responsibility for future action or inaction. He claims, however, that he urged upon his successor, Mr. A. H. Heber, under whom Mr. Rockwood was chief engineer, the necessity of lowering the gate level, and practically extracted a promise from him that he would put in the two suggested supplementary gates. This was not done.

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